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ABSTRACT

Volume II of a national needs assessment of science education in two-year colleges, consists of six appendices which provide supporting material and supplementary tabulations of data related to the study described in Volume I (SE 033 603). Appendices A, B, and C consist of descriptions of the following in subsequent order: sample design and the sampling methods used to select colleges, faculty and students: sources for selection of the sample of colleges studies: and correction procedures for reclassifying colleges after feedback was obtained from the initial sample. Appendix D contains tabulations of data obtained through the use of questionnaires sent to students, faculty, and institution officials. Appendix E includes institutional faculty, and student questionnaires. Weighting procedures are explained in Appendix F. (Author)

A COMPREHENSIVE ASSESSMENT OF SCIENCE EDUCATION IN THE TWO-YEAR COLLEGE

Volume II. Appendices

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APPENDIX A

Sample Design for Study of Science Education in Two-Year Colleges*

*Reprinted from "Supporting Statement for the NSF Science Education OMB Package" (Feb. 6, 1979), Appendix, pp. 1-14. This study design was prepared in response to the instrument clearance request by the Office of Management and Budget; the design described here was used without substantive change.

APPENDIX

SAMPLE DESIGN FOR STUDY OF SCIENCE EDUCATION IN TWO-YEAR COLLEGES

1. Major Goals of Survey from Point of View of Determining Sample Design

The survey will examine the status of science education in two-year colleges in a number of different ways. The sample design will attempt to minimize the sampling errors applicable to major analyses that are contemplated, subject to limitations arising from two sources. The first source is obviously the budget for the study which establishes the maximum number of sample units that are possible. The second source arises from the fact that there are multiple kinds of analyses planned, and there is no sampling strategy that simultaneously minimizes the sampling errors for all the analyses. Some compromises are thus necessary. The conflicts in the goals and the compromises we propose to follow are described below.

1.1 General Analytic Issues Affecting Sample Design

In examining the information needs leading to the study, it is clear that three separate types of units of analysis exist - the school, the faculty, and students. The schools determine the policies followed, either on their own or as arms of the States. It is important to obtain data on the faculty teaching science courses; on their training, how their education relates to the specific courses they teach, etc. In regard to students, there are important questions for which data are needed: to what degree are "special" or nonmatriculated students influencing course selection; does matriculation in recognized programs still mean anything distinctive in two-year colleges; what motivates the students to take the science courses in which they are enrolled.

The study will thus require three kinds of respondents and consequently three populations to be sampled. A nested sample design is a particularly efficient method for carrying out such multiple objectives. In the present context, this involves first selecting a sample of schools, selecting a sample of the science faculty within the designated schools, and finally selecting students from those taking courses taught by the teachers in the sample. Part of the efficiency is due to economics resulting from the simpler administrative needs from such a design - the sampling is simplified, and less college personnel have to be contacted. A second important advantage of a nested design is the ability to correlate information from the various respondent categories. For example, it will make it possible to cross classify characteristics of students by the characteristics of schools, or faculty.

The sample sizes planned are 200 schools, 1,000 faculty members, and 4,000 students. These sample sizes are dictated partly by the budget for the study and partly by the analytic needs. The classifications of schools for which separate data are to be shown will contain only a few categories, in some cases two groups, in others five or six groups. A modest size sample is enough to produce such statistics with reasonable reliability. More elaborate classifications are planned for faculty members, and even more detailed ones for students. Consequently, the larger samples are necessary for these respondent groups. Later sections of this report will describe the technique to be used in selecting these samples.

1.2 Tabulations in Which School is Unit of Analysis and Those with Student as Unit of Analysis

Both types of studies are planned. Some tabulations will contain distributions of the number of schools having certain characteristics relating to science education. In such tabulations, schools are treated as equivalent units of analysis, and equal probability selection is normally the best strategy. Other types of tabulations will concentrate on students, for example, the number of students taking particular courses in science, the number who expect to go on to a four-year institution, etc. For those kinds of statistics, the most effective strategy is usually to select schools with probability proportionate to size (PPS), and subsample students within the schools in such a way as to achieve equal probability of selection for students.

It is obvious that both kinds of sampling methods cannot be applied in a single survey. A compromise sampling technique that is usually applied when there are such conflicting goals is to select with probability proportionate to the square root of size. This is not an optimum strategy for either analyses of schools or students but will produce reasonably small sampling errors for both kinds of statistics, whereas using either PPS or equal probability of selection will create quite large sampling errors for the groups for which it is not optimum. We, therefore, plan to use probability proportionate to the square root of size for the selection of the sample schools.

1.3 School Classifications of Particular Interest

There will be a number of ways in which schools will be classified for separate analyses. The two of prime importance are:

(a) Public versus private schools; and
(b) Technical schools versus other schools.

Private schools constitute about 16 percent of all schools. Technical schools account for an even smaller proportion of schools - about ten percent. If the average size of private and technical schools are about the same as all schools, the total sample of 200 schools will contain about 32 private schools and 20 technical schools. However, these schools tend to be below average in size and their representation in the sample will thus be ever smaller.

We plan to insure that there is a minimum of 20 to 25 sample schools for each class to be analyzed separately. If it appears that straight application of probability proportionate to the square root of size will not produce a sufficient sample for both of these groups, they will be established as a separate stratum which will be sampled at a higher rate to guarantee that at least 20-25 sample cases are selected.

1.4 Size Class Analysis

Another type of school classification that will be of importance in the analysis is a breakdown by size. At present, we contemplate the major analyses of schools by enrollment size classes, to be for the following classes:

Under 1,500
1,500 - 7,499
7,500 and over

As is the case for the type of school analysis, we plan to select the sample in such a way as to insure a mimimum of about 40 to 42 schools in each of the three size categories to be used for analysis.

1.5 Other School Classifications

There are several other types of school classifications that are planned, geographic tabulations by region of the country tabulations by population density such as schools inside or out of SMSA's, and possibly others. Sample size will not be a limiting factor for these breakdowns and as a result, it is not necessary to increase sampling rates for any subgroups to enable such analyses to be made. To the extent possible, stratification will be used to improve statistics for these additional classifications, but no other special procedures are planned.

1.6 Faculty and Student Classification

It is imporant to analyze separately the following five groups:

1. Social Science;
2. Mathematics, statistics and computing;
3. Life sciences;
4. Physical sciences;
5. Engineering and technological.

To the extent possible, the sample of faculty and students should be approximately equal for groups 1, 2 and 5 above, and with a larger sample for the natural sciences. In the natural sciences, about half the sample should be students in life sciences, and about half physical sciences.

The requirement for approximately equal size samples in the science categories will have to be combined with two other sampling requirements, important for statistical efficiency and administrative control. One requirement is that there should be approximately equal-probability samples of both faculty and students within each of the five science groups. The second is that it is desirable to have about equal workloads within each sample school. It is unlikely that all of these requirements can be met exactly. The sampling method we plan to apply in order to come as close as possible to meeting these requirements is described in Section 3 of this report.

2. SAMPLING METHODS USED TO SELECT COLLEGES

2.1 Sampling Frame

The sampling frame will be the most current list of schools in the records of the American Association of Community and Junior Colleges (AACJC). A check of the various lists possible has convinced us that this is the most complete list available.

The AACJC list contains the following information that can be used for stratification and assignment of measures of size:

State;
Number of students enrolled;
Private or public school; and
Technical school or other.

2.2 Stratification

Prior to sample selection, the AACJC file will be stratified in several ways. One reason for the stratification is to permit different sampling rates to be applied. A second reason is to improve the efficiency of the sample. There will be three stages of stratification:

(a) The first stage will be a four-way stratification consisting of private schools versus public schools, and within each of these, technical schools versus other;

(b) The second stage will be an enrollment size class breakdown within each of the four classes above. The size classes are:

Under 500
500 to 1,499
1,500 to 2,499
2,500 to 4,999
5,000 to 7,499
7,500 to 14,999
15,000 and over

(c) The third stage will not constitute stratification in the way it is usually carried but will provide the basis for geographic stratification. It will consist of sorting the file by State, within each stratum identified as a result of (a) and (b). The States will be arranged in geographic order. As will be indicated later, a systematic sample is planned, that is one in which every n^{th} case within a stratum is selected. Sorting the schools in State order will then automatically provide very detailed geographic stratification.

Counts will be prepared of the number of schools and the number of enrollees in each of the 28 strata resulting from (a) and (b). These counts will provide the data necessary to determine the sampling rates.

2.3 Allocation of Sample to 28 Strata

The determination of the sample size for each of the 28 strata will be done in several stages. The first stage is to calculate preliminary sampling rates for each of the seven size classes.

In Section 1.3, it was stated that school sampling would be with probability proportionate to the square root of size. This kind of sampling can be carried out in two ways.

One is to assign measures of size to each unit (in the present study, the measure would be square root of enrollment) and use standard methods of selection with probability proportionate to measure of size. The second way is to stratify the frame by size; treat all units within a stratum as if it had the average measure of size in the stratum, determine probabilities of selection so that they vary according to the square root of the average measure of size of the strata, and select units with equal probability within strata using the calculated probabilities of selection. We plan to use the second method. It does not provide exact probabilities proportionate to the square root of size but is a close approximation. It is an unbiased procedure, and its advantage is that it has more flexibility than a straight PPS selection method.

With this type of sampling procedure, the sampling rate in each size stratum is:

$$r_i = \frac{200(S_i/N_i)^{\frac{1}{2}}}{\Sigma(S_iN_i)^{\frac{1}{2}}}$$

where

200 is the total sample size;
S_i is the number of students in the i^{th} size stratum; and
N_i is the number of schools in the i^{th} stratum.

The sample size in each stratum will be

$$n_i = r_iN_i$$

$$= \frac{200(S_iN_i)^{\frac{1}{2}}}{\Sigma(S_iN_i)^{\frac{1}{2}}}$$

The second stage will be to examine the preliminary sample sizes for each analysis group, that is for each of the three size class listed in Section 1.4, for private and public schools, and for technical and other schools. (The total for each of these groups will be examined, not the cross-classifications of these groups.) If there are 20 or more sample schools in each group, no changes in the preliminary sampling rates will be necessary. If the sample sizes for some groups are below 20, the sampling rates in those groups will be increased to provide about 20 to 25 cases. The rates for other groups will be reduced to retain the 200 sample sizes after the new rates have been applied to make sure some other group has not been brought down to below the 20 level, and if so, to readjust the sampling rates again. Several iterations of this type may be necessary. The final sampling rates and sizes will be the ones established in the final iteration.

2.4 Sample Selection Methods

Once the sampling rates have been established, a systematic sample of schools will be selected in each stratum. For each stratum, a random number will be selected equal to less than the sampling interval (i.e., the reciprocal of the sampling rate). This random number will determine the first school selected. Every n^{th} case following will then be selected, where n is the sampling interval.

In practice, we plan to select about 10 percent more schools in each stratum than required by the allocation described in Section 2.3. The additional sample schools will be held in reserve, and only used if some unusual nonresponse pattern develops. In that case the sample may have to be supplemented in some strata. The reserve sample will constitute a random selection within strata and can thus be used for the supplementation.

3. SAMPLING METHODS FOR FACULTY AND STUDENTS

As indicated earlier, we plan to select a sample of about 1,000 teachers and 4,000 students. More specifically, we will select a sample of 1,000 science classes at the 200 sample schools. The instructors for the sample classes will then be the sample faculty. Within each class four students will be randomly selected to create the student sample.

3.1 Selection of Classes and Teachers

An Initial sample will be selected with the following characteristics:

(a) The total sample size will be 1,000 classes, consisting of about 200 classes in each of the five fields of science

(b) Within each of the five fields, the sample will be selected with equal probability.

These goals will be achieved by carrying out the sampling procedure in the following way. Counts will be prepared of the number of classes in each school, in each of the five fields. Let C_{ij} be the number of classes in the j^{th} school and i^{th} field. Let the probability of selection of the j^{th} school be P_j. The sampling rate within the schools will be denoted by r_{ij}. (Note that diffeent sampling rates will be used for the various field, within each school.) The overall probability of selection of any class is the product of the probability of selecting the school and the probability of selecting the class, when the school is selected. We want these to be equal for each field. Thus, $r_{ij}P_j$ should be independent of j and equal to r_i. Thus,

$$r_{ij}P_j = r_i \text{ and}$$

$$r_{ij} = r_i/P_j.$$

In order to obtain the value of r_i, we use the fact that the sample size for the field should be n_i. The sample size will be the result of applying the sampling rate r_{ij} to the number of classes, C_{ij}. Consequently,

$$\sum_j r_{ij}C_{ij} = n_i$$

$$r_i = \frac{n_i}{\sum_j C_{ij}/P_j}$$

Sampling at these rates will satisfy the three conditions stated earlier. However, it will not control the sample size within school. The average number of sample classes per school will still be five, but there may be considerable variation from school to school. There is no way of simultaneously equalizing the total sample size per school and the overall sampling rates. From the point of view of statistical reliability, it more important to have self-weighting samples than to have equal workloads. Unfortunately, either very large or very small workloads create problems in administering the program.

We plan to keep the variation in workloads within limited bounds by identifying extreme situations and adjusting the sampling rates and sizes to keep within these bounds for most schools. A final decision on the width of the bounds has not yet been reached, but it is likely to be a range of about three to eight. In effect this would mean that in a school with less than three sample cases, the sample would be increased to three, and if there are more than eight, there would be sub-sampling to bring the number down to eight.

These adjustments in sampling rates are likely to result in some deviation from 1,000 in the total sample size. Care will be taken to insure that the final sample size will remain close to 1,000.

The sample classes will automatically identify the sample teachers. In a few cases, the same teacher may be identified in two or more sample classes. There will be no substitutions in these situations. The actual number of teachers in the sample may therefore be a little under 1,000.

It should be noted that the procedures described in this section do not guarantee a minimum sample size for each of the categories of schools listed earlier. We do not anticipate any serious problems of this type. The probabilities assigned to the schools and the plans for supplementing small workloads are likely to provide a sufficient sample for each school category. However, before data collection begins, we will prepare counts of sample classes, by school category. If necessary, additional adjustments in the sample will be made.

3.2 Selection of Student Sample

Within each sample class, four students will be randomly selected. In those cases there two classes identified the same teacher, both classes will be retained for the student sample. The student sample will therefore remain at the level of about 4,000 even if the number of teachers falls somewhat below 1,000.

The sample selection will be carried out in the school. The students in each class will be listed in some simple sequence, e.g. alphabetically, by assigned number, or in some similar natural order. The school staff carrying out the project will then refer to a table, supplied to them by Westat, which will indicate which students are to be included in the sample.

APPENDIX B

Source for Selection of a Sample of Two-Year Colleges

APPENDIX B

SOURCE FOR SELECTION OF A SAMPLE OF TWO-YEAR COLLEGES

Given the study design, a listing of two-year colleges had to have the following characteristics:

a. Contain all public and private colleges offering two-year degrees, excluding proprietary institutions, since these were not surveyed.

b. Contain the following information in clear form for each college:

- Name, address, and chief executive officer;
- Type of institution -- comprehensive or technical;
- Type of control -- public or private;
- Locus of control -- state agency, multicampus local system, university branch, single unaffiliated campus; and
- Student enrollment -- full- plus part-time enrollment for credit.

c. Contain recently collected information, particularly for student enrollment and preferably for the academic year 1978-79, since the survey was to take place in Spring 1979.

d. Indicate subsidiary campuses for college systems, listing each separately so that all campuses have an equal chance for selection.

Several sources were examined, including some commercial listings used by book publishers. However, only two sources appeared to be potentially useful in meeting the criteria listed above. They are:

- The Directory of Community, Junior, and Technical Colleges, issued annually by the American Association of Community and Junior Colleges (AACJC). Although AACJC is the professional organization for two-year colleges, the directory is not a membership list; it does, however, indicate membership in AACJC. The listing is updated annually through a survey each September. The new directory is published by February, so that information is current for the academic year of publication. Multicampus systems and state systems are listed. Private colleges are listed, but only those that are nonprofit. This source initially was evaluated using the 1978 edition, with data collected for the 1977-78 school year.

- The Education Directory, Colleges and Universities, 1977-78, issued by the National Center for Education Statistics (NCES). This directory lists all degree-granting institutions at all levels for which survey data were received. The listing available to Westat for the present study was compiled from data collected in May 1977 as part of the HEGIS package mailed out at that time. State agencies supplied a large part of the data from state records or from intrastate mailings and coordination of responses. Since the compilation of this list was part of the annual HEGIS statistical survey, the desire was to minimize the burden to individual institutions, although some direct correspondence with colleges occurred when necessary. To be listed in this directory, colleges must be accredited by appropriate agencies, have pre-accreditation status, or have their credits accepted by at least three accredited institutions to which their students may transfer.

Included among the two-year colleges in this directory are proprietary colleges and those operated for profit. Although data collection for this edition was completed in November 1977, the information was current for the academic year beginning September 1976.

While many of the same two-year colleges appear in both of these directories, the overlap is far from complete. One major difference is the inclusion by NCES of colleges operated for profit; another is the lower probability of NCES contacting private colleges through its data gathering procedures. AACJC is more likely to be in touch with private colleges, since many of them are AACJC members, and is more likely to reach them with survey forms. Examination of listings for several states shows the NCES directory to be deficient in listings for private colleges that are nonprofit. NCES' directory also contains fewer public colleges than does AACJC's, possibly because the NCES survey forms are not mailed directly to colleges. Some discrepancies in classification of colleges also may be attributable to use of the secondary source (state agencies) by NCES. Finally, the NCES directory is less complete in its listing of branch campuses of multicampus colleges. Comparing listings of the two-year colleges in the two directories, we derived the following totals:

	AACJC (1977)	NCES (1976)
Publicly controlled	1,037	925
Independent (privately controlled)	198	249*
TOTAL	1,235	1,174*

*Includes undetermined number of independent colleges operated for profit and not desired for Westat's study.

While the discrepancies among the numbers of private colleges may be explained easily, discrepancies in numbers of public colleges are more problematic. The year's difference in data collection hardly explains a 12 percent differential, although AACJC does note a 2 percent increase from 1976 to 1977 in the number of public colleges, as well as some changes in names and control and some college closings. One state in which NCES shows more public colleges than AACJC is Pennsylvania (38 compared to 17). This difference arose from the listing of the two-year branch campuses of Pennsylvania State University (18) and the University of Pittsburgh (3). Because NCES went directly to the Pennsylvania state agency, which controls these two university systems, an apparently complete listing was received, whereas AACJC received no replies directly from the branch campuses. Scattered through the directory are a few other colleges reported only in the NCES listing.

Despite NCES' reliance on state agencies, in several other states complete listings of large groups of state-controlled two-year colleges were not obtained. AACJC shows more campuses than NCES in these states: Alabama, 32 to 20; Kentucky, 15 to 1; Wisconsin, 51 to 17. In many other states there are smaller discrepancies in favor of AACJC.

Each directory shows enrollment information current for the year of data collection, as well as the state and locus of control of each college. Neither directory distinguishes technical institutes from comprehensive colleges, but this information was also obtainable.

Both organizations had data tapes that could be made available to Westat. NCES information was current only for the year 1976-77, while the AACJC tape contained the listings for its 1978-79 survey, the same year in which Westat's survey was to be

conducted. An agreement was reached with AACJC for release of the portion of their tape that contained only the elements essential for this study; those portions that AACJC wished to maintain as confidential thus were protected.

The AACJC directory was more suitable for this survey and is the source from which the sample of colleges was drawn.

APPENDIX C

Correction Procedures for Reclassifying Colleges

APPENDIX C

CORRECTION PROCEDURES FOR RECLASSIFYING COLLEGES

The Directory of Community, Junior, and Technical Colleges, 1979 edition, published by the American Association of Community and Junior Colleges (AACJC), was used to draw the initial sample of 240 colleges for this study. The directory contains information on 1,245 colleges, as well as the separate campuses of multicampus institutions, including student enrollment (the sum of full- and part-time students), source of control (private or public), type of program (comprehensive or technical institute), and geographic location. All of these elements were used in selection of the sample for this study.

The directory was not yet in print when information was needed to select the sample, but all forms used by AACJC for the collection of data from colleges during the fall of 1978 had been received by that organization, and data processing had been finished. AACJC graciously permitted Westat to use the tape containing 1979 directory information, in an edited form to protect what AACJC considered to be confidential information.

The procedure followed by this study was to select an initial sample of 240 colleges with the help of the directory and then to request each of these colleges to participate, with the expectation that 200 would accept. The colleges also were asked for copies of their catalogues, class schedules for the spring semester or quarter, and designation of a local coordinator to direct the data collection on each campus. Returns from the 185 colleges agreeing to participate revealed some discrepancies in information contained in the directory. The catalogues for a number of colleges showed more than one campus not listed in the

directory. The program offerings of several colleges more closely resembled those of technical institutes than of comprehensive colleges, as their directory listings indicated. It also was discovered that some colleges calling themselves technical institutes really offered comprehensive programs, although their program emphasis was heavily technical. These discrepancies were probably attributable to inaccurate reports sent to the directory by the colleges themselves during the Fall 1978 survey by AACJC.

Some of the responding colleges showed more than one campus of which we were previously unaware. In these cases, the college selected which of its several campuses would respond to the survey, in keeping with Westat's original request that response be confined to the individual campus level. This situation, however, led to discrepancies in some cases between enrollment figures in the directory for the entire college and actual enrollment at the individual campus participating in the study. Fortunately, changes in classification of college size were not required in most of these cases, since the designated campus was usually the largest, and the categories used in the study to describe college size were broad enough to accommodate the change.

One other discrepancy came to light. Included in the institutional questionnaire was a question on numbers of students enrolled, inserted mainly to identify the multicampus colleges described above. A large number of responses to this question yielded figures different from those listed in the directory, enough so to necessitate reclassifying a few institutions by four size categories and many others by one or two categories. Telephone calls were made to the registrars of these campuses. In some cases the questionnaire responses were erroneous, apparently having been inaccurate estimates by local coordinators rather than official enrollment figures. In most cases, however, the registrars affirmed the questionnaire responses.

As a result of these reviews, the colleges in the responding sample of 1168 campuses were reclassified. The corrected sample showed the following changes from the information originally obtained from the directory:

Type of change	Number of colleges
Add campus designation	13
From comprehensive college to technical institute	9
From technical institute to comprehensive college	2
Change in student enrollment category	26
Change from private to public	1

APPENDIX D

Supplementary Tabulations

INSTITUTIONAL QUESTIONNAIRE DATA

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FACULTY QUESTIONNAIRE DATA

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*Appendix table and figure numbers indicate the questionnaire and questionnaire item number from which the data were derived. For example, Figure IQ-7 is based on administrators' responses to question 7 on the institutional questionnaire; data displayed in Tables FQ-25(1) and FQ-25(2) were taken from responses to question 25 on the faculty questionnaire. Reprints of the institutional, faculty, and student questionnaires are contained in Appendix E.

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STUDENT QUESTIONNAIRE DATA

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re IQ-7. Percent distribution of administrators' preferences for faculty improvement: average percents for each type of college compared with all colleges combined, by improvement option and aspect of teaching

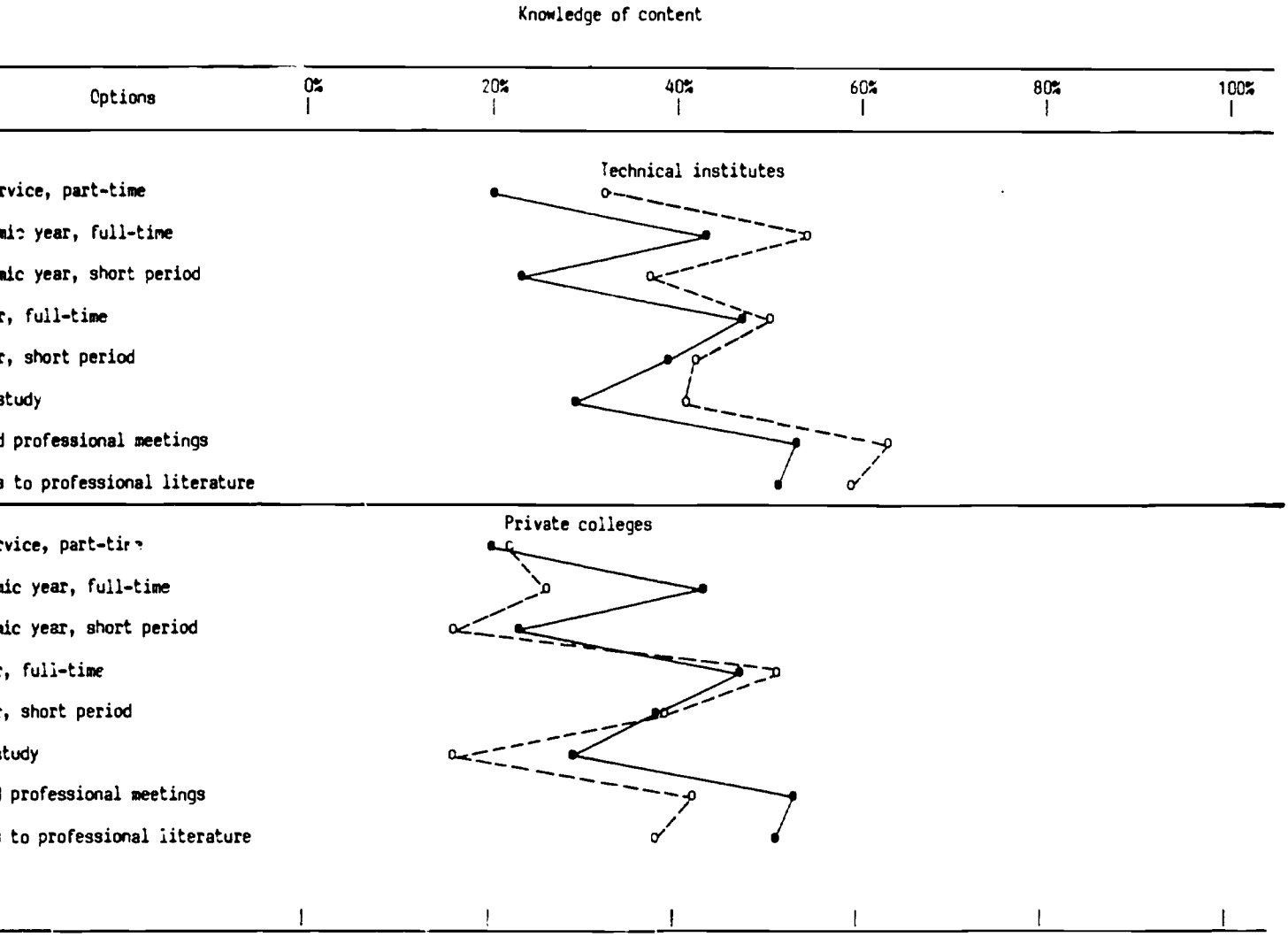


Figure IQ-7. Percent distribution of administrators' preferences for faculty improvement: average percents for each type of college compared with all colleges combined, by improvement option and aspect of teaching (continued)

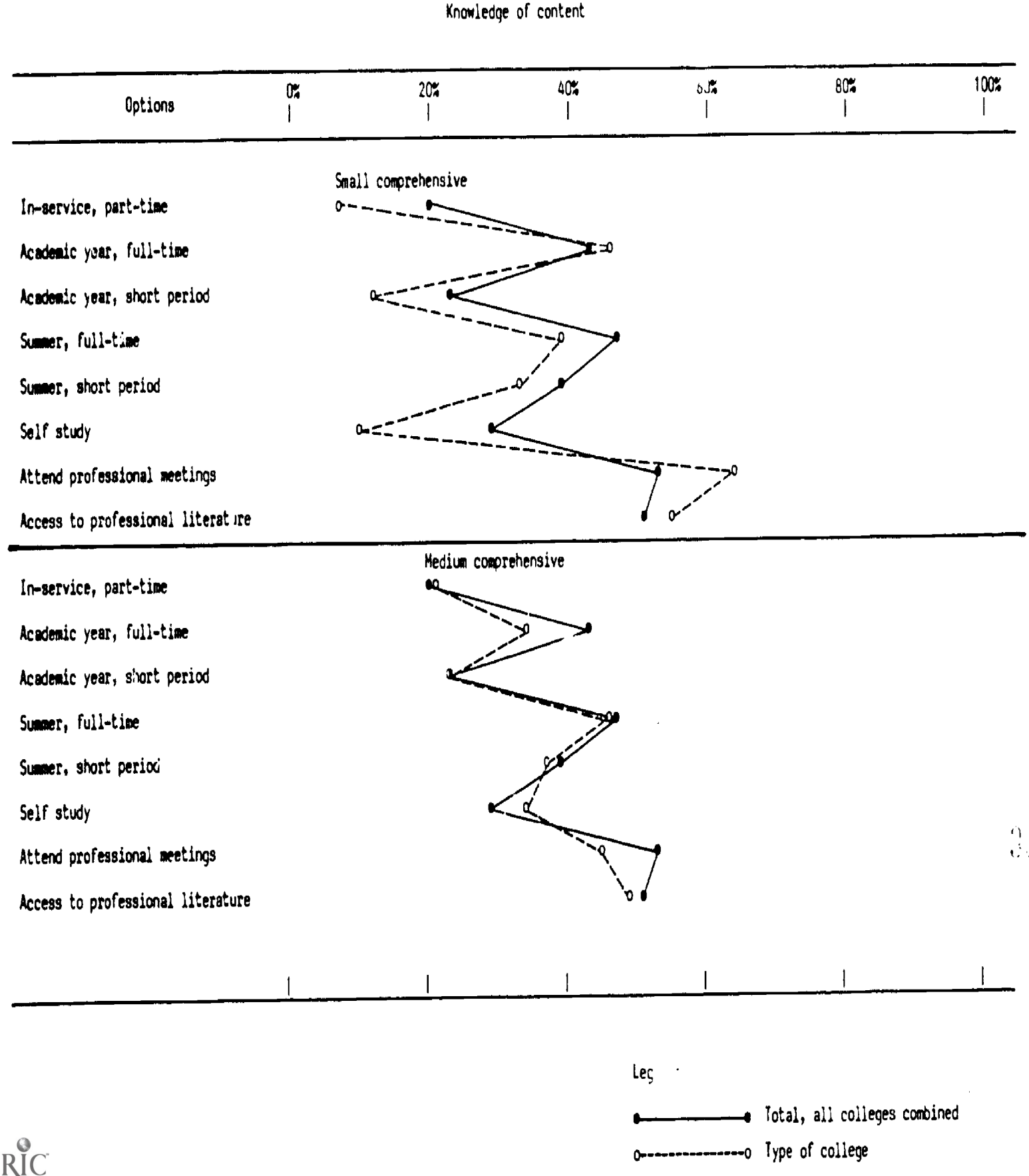
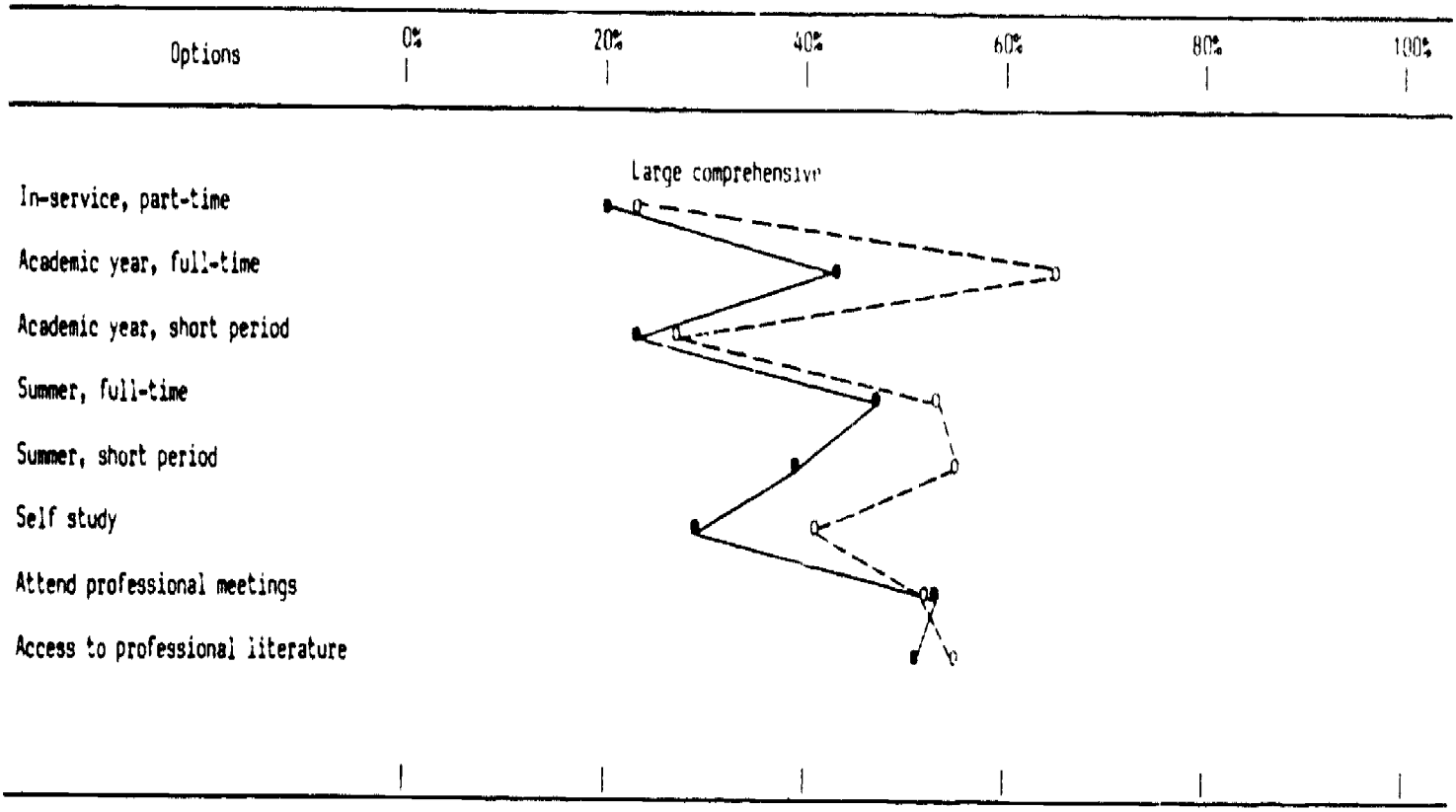


Figure IQ-7. Percent distribution of administrators' preferences for faculty improvement: average percents for each type of college compared with all colleges combined, by improvement option and aspect of teaching (continued)

Knowledge of content



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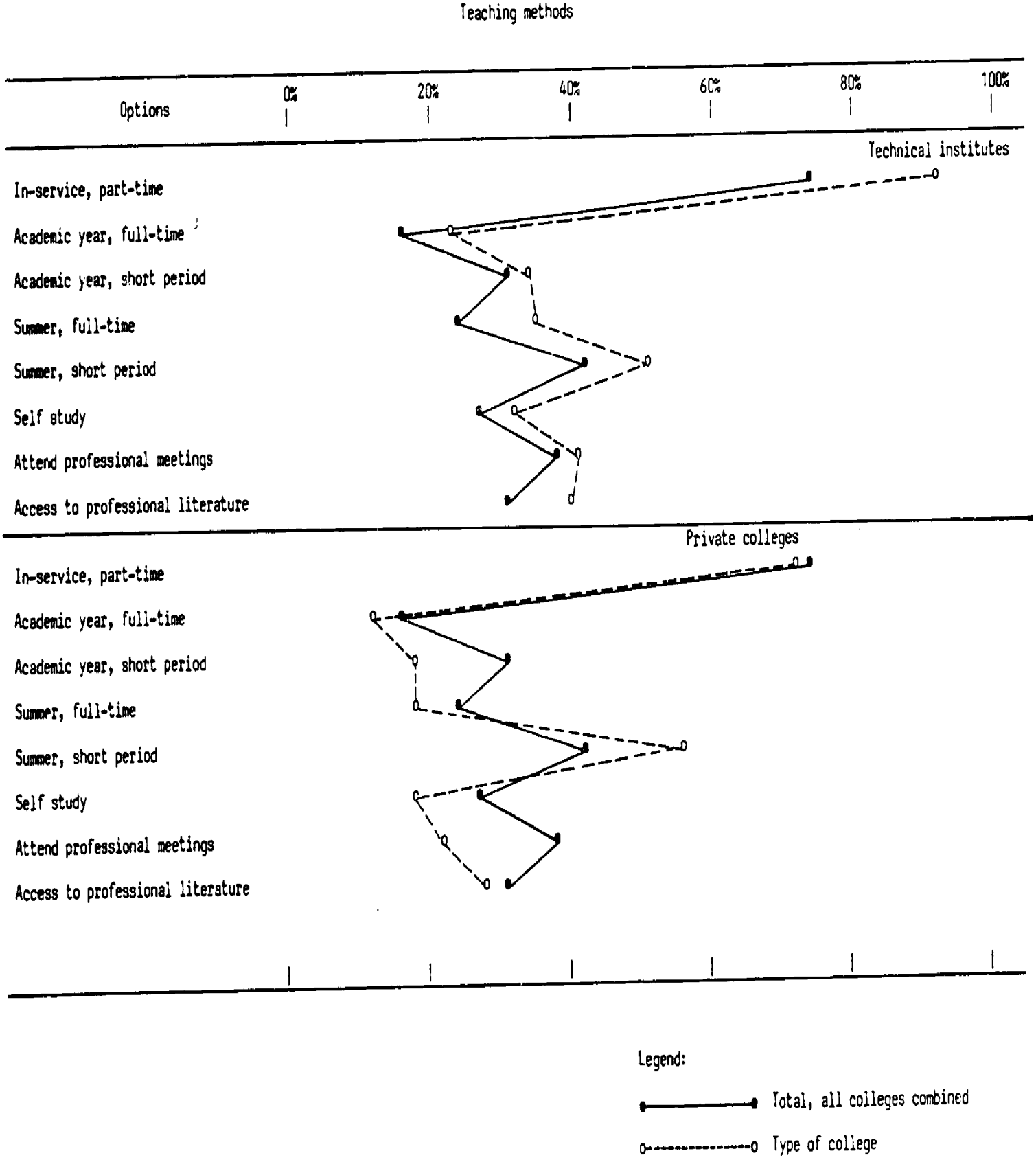
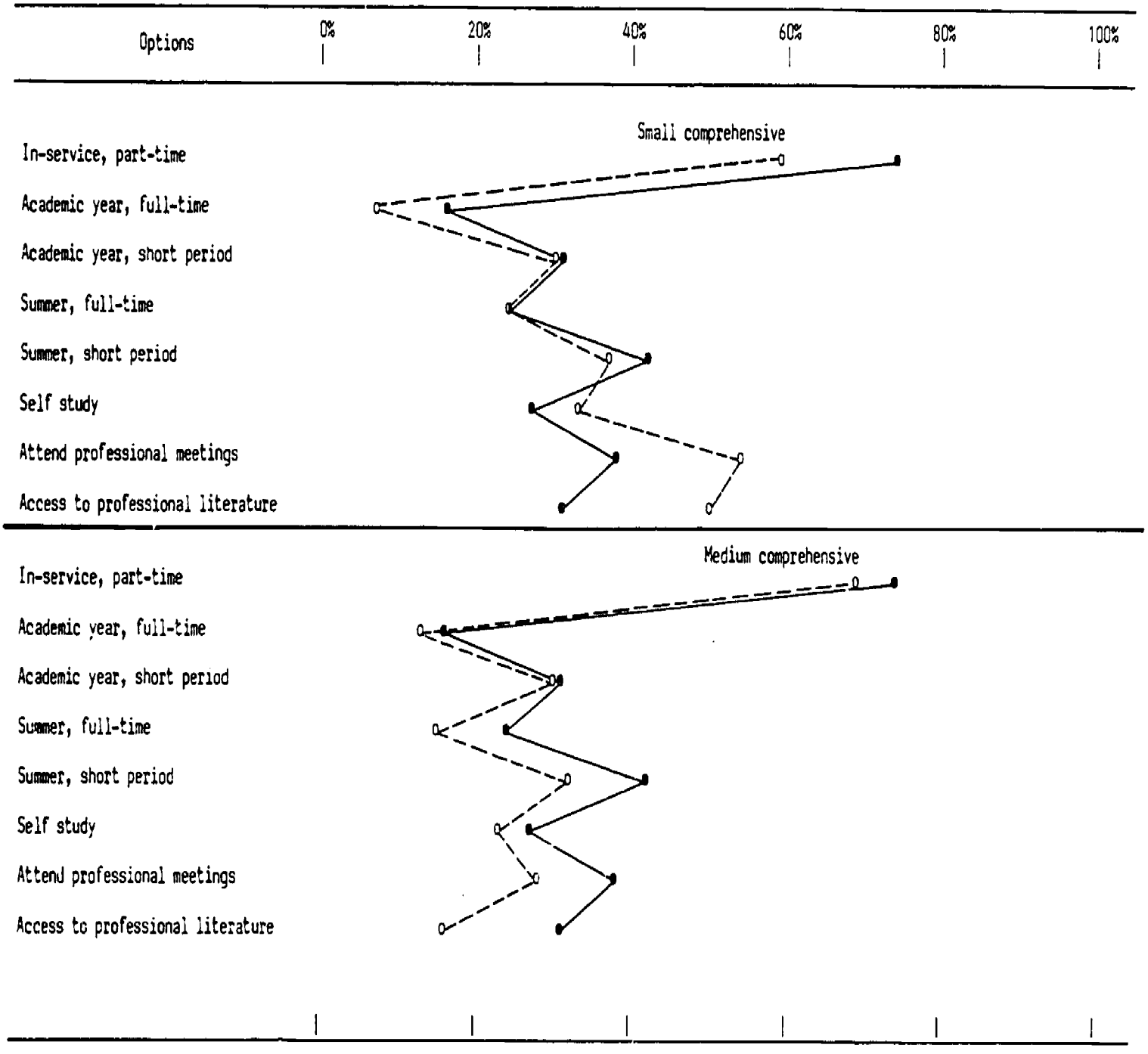


Figure IQ-7. Percent distribution of administrators' preferences for faculty improvement: average percents for each type of college compared with all colleges combined, by improvement option and aspect of teaching (continued)

Teaching methods



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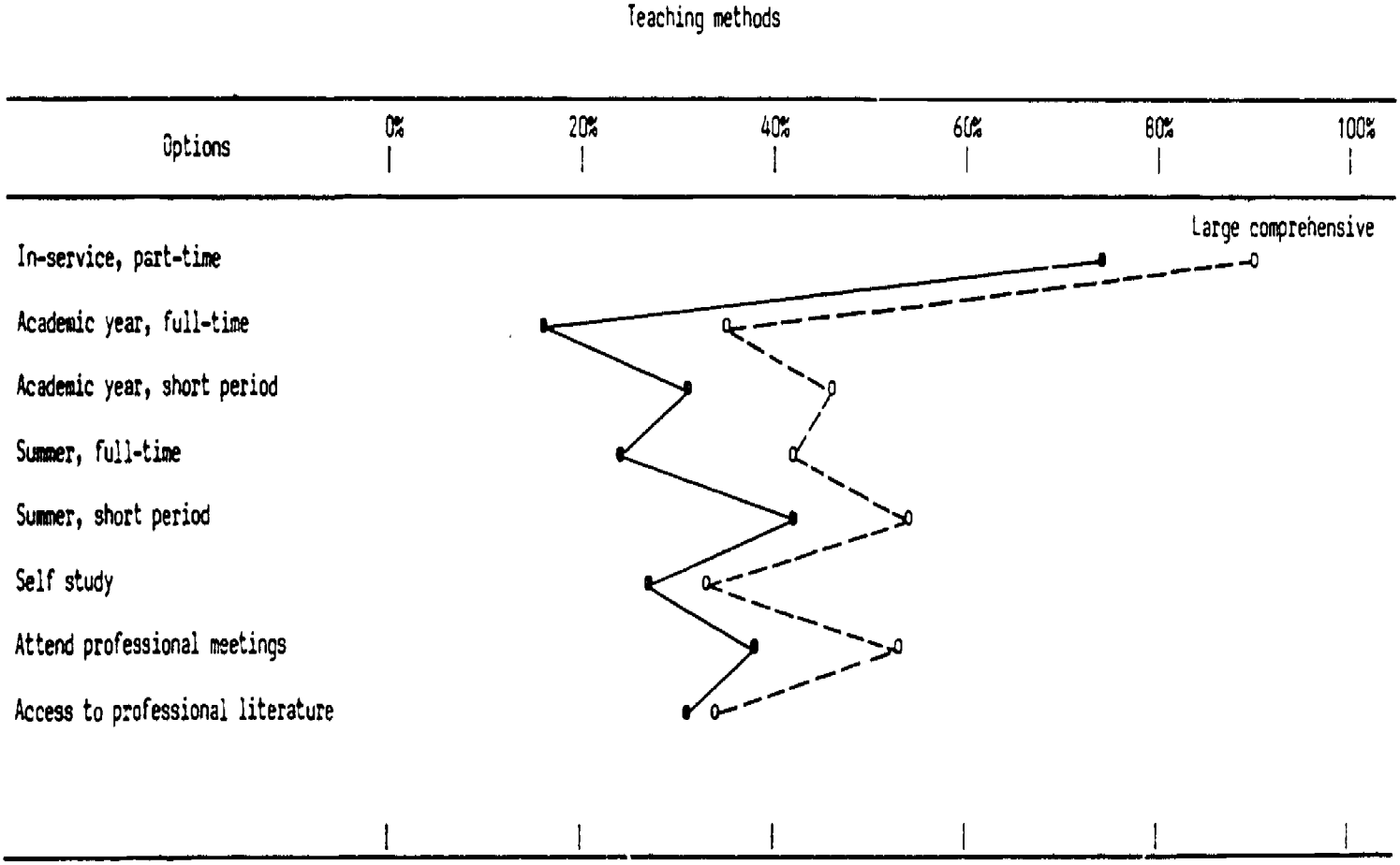

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Practical work experience

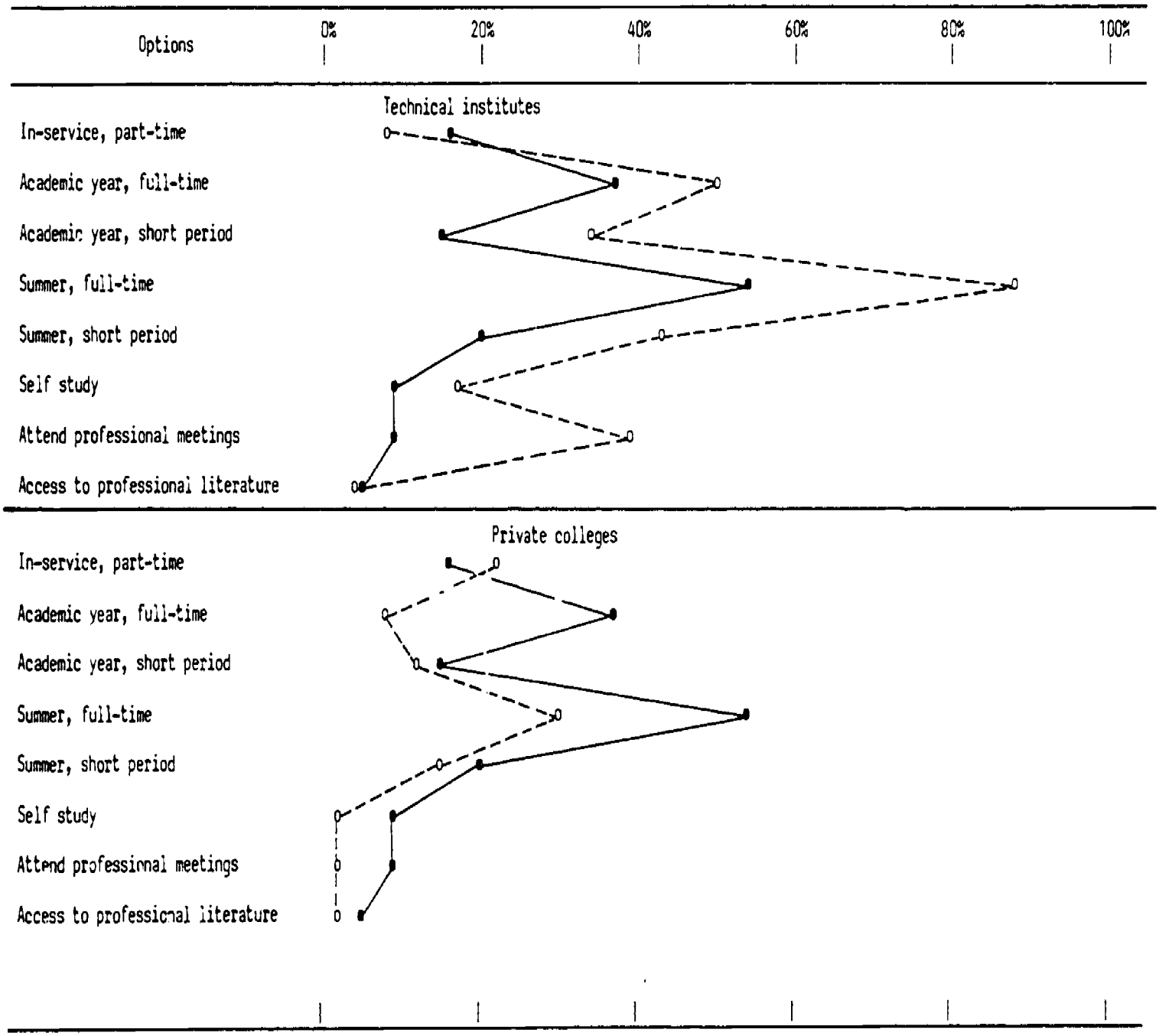
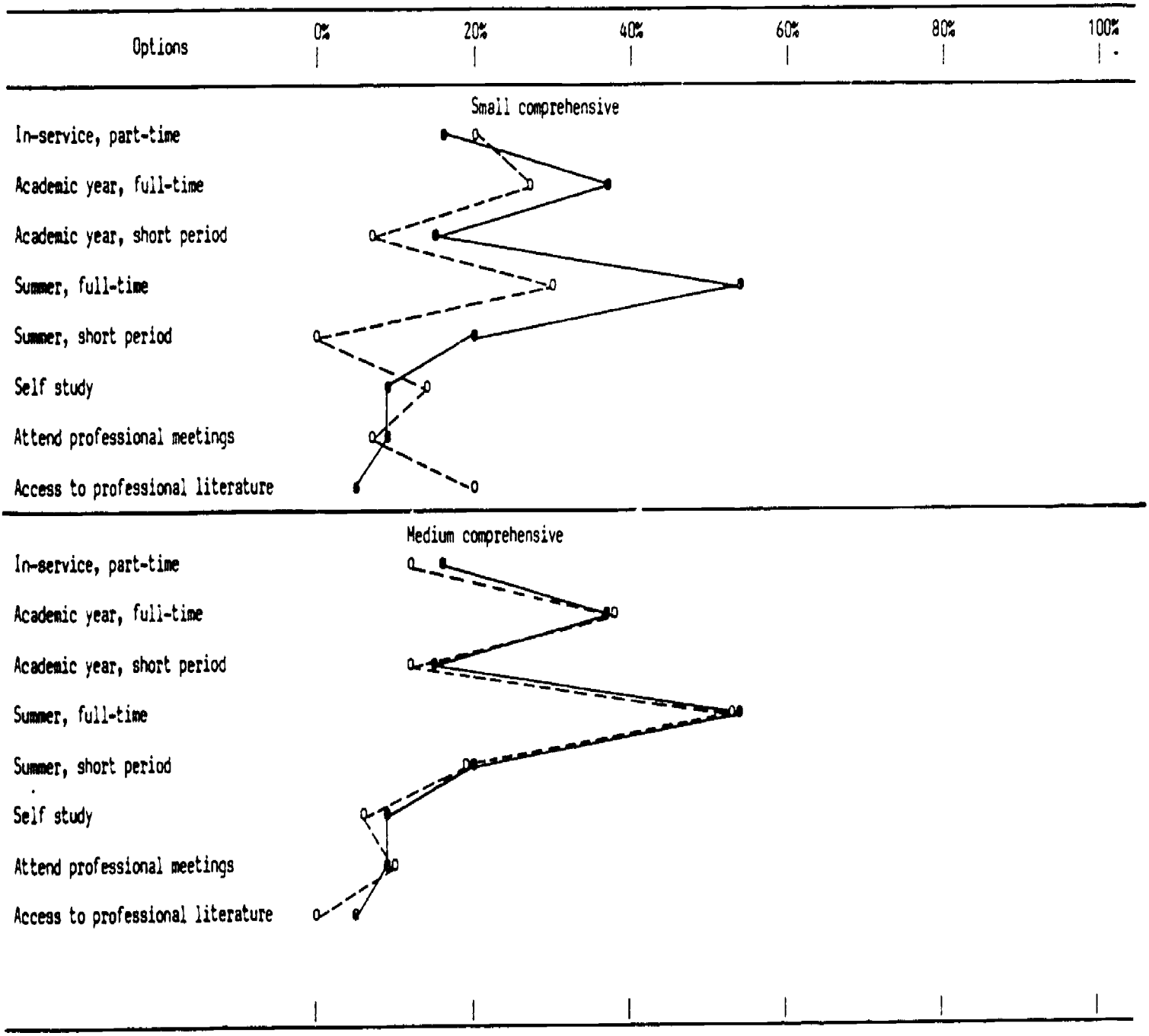


Figure IQ-7. Percent distribution of administrators' preferences for faculty improvement: average percents for each type of college compared with all colleges combined, by improvement option and aspect of teaching (continued)

Practical work experience



Legend:

Total, all colleges combined

Type of college

Figure IQ-7. Percent distribution of administrators' preferences for faculty improvement: average percents for each type of college compared with all colleges combined, by improvement option and aspect of teaching (continued)

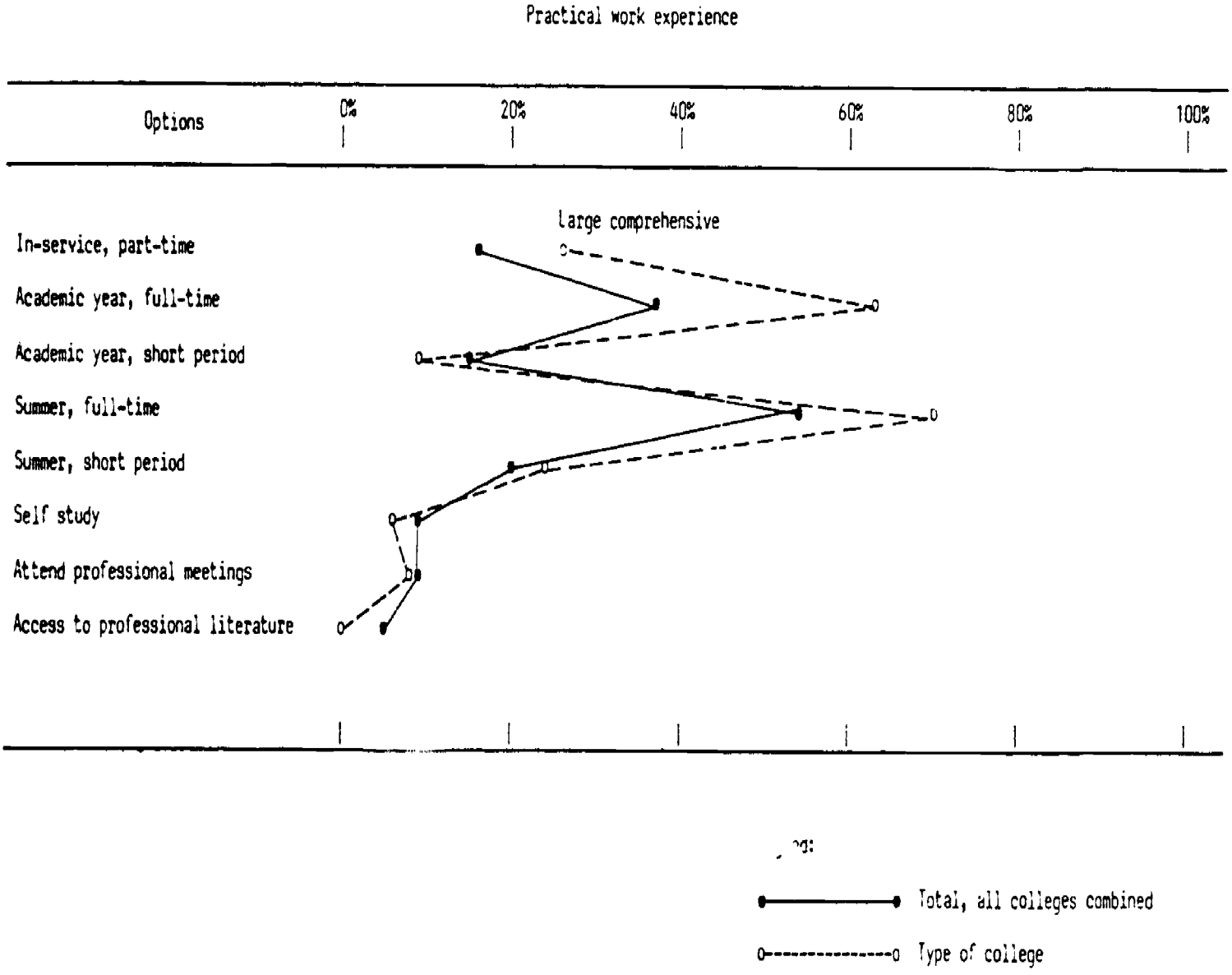


Figure IQ-7. Percent distribution of administrators' preferences for faculty improvement: average percents for each type of college compared with all colleges combined, by improvement option and aspect of teaching (continued)

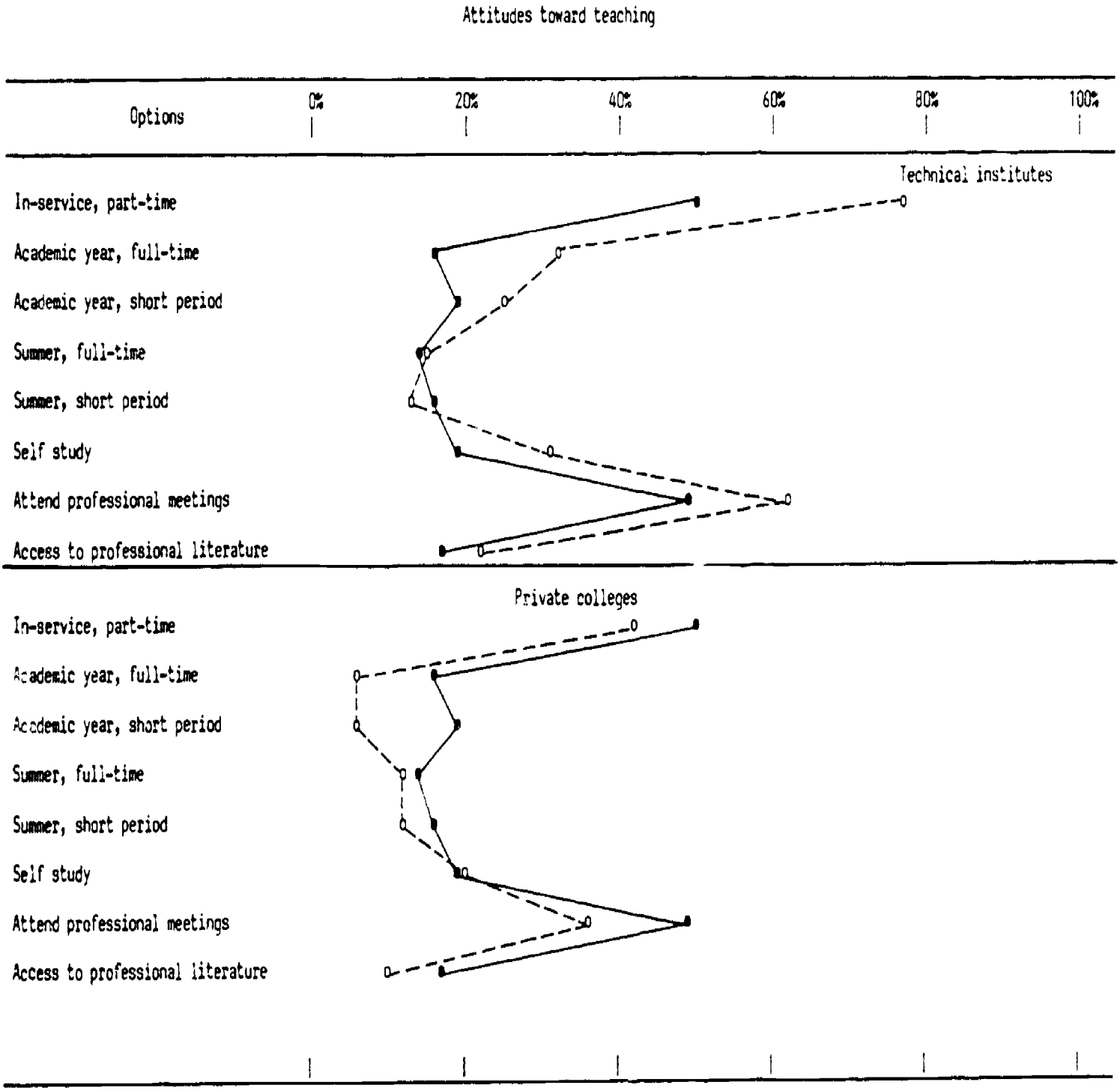


Figure IQ-7. Percent distribution of administrators' preferences for faculty improvement: average percents for each type of college compared with all colleges combined, by improvement option and aspect of teaching (continued)

Attitudes toward teaching

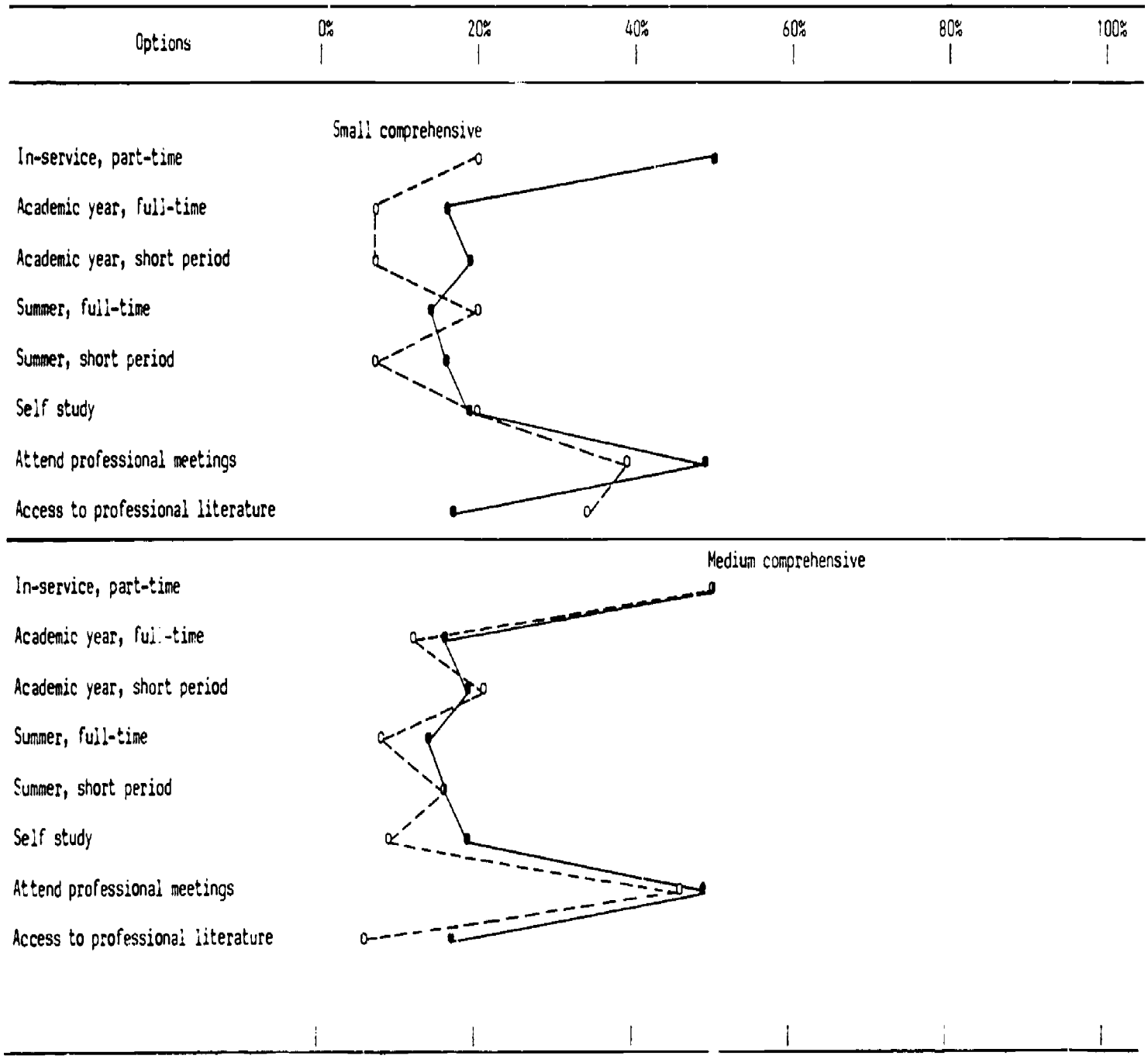
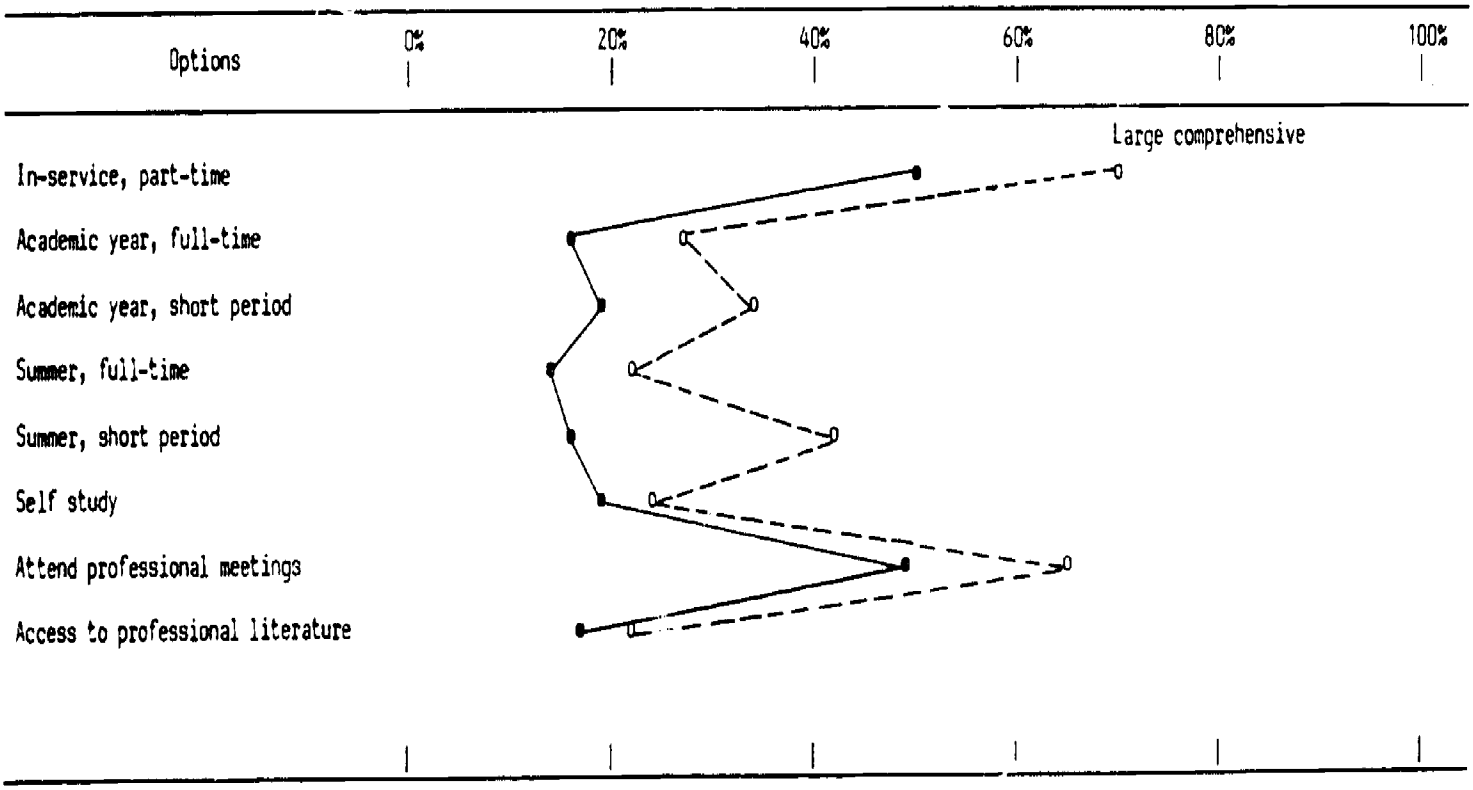


Figure IQ-7. Percent distribution of administrators' preferences for faculty improvement: average percents for each type of college compared with all colleges combined, by improvement option and aspect of teaching (continued)

Attitudes toward teaching



Legend:

Total, all colleges combined

Type of college

Figure IQ-13(1). Percent distribution of administrators indicating highest priority student needs, by type of need and type of college

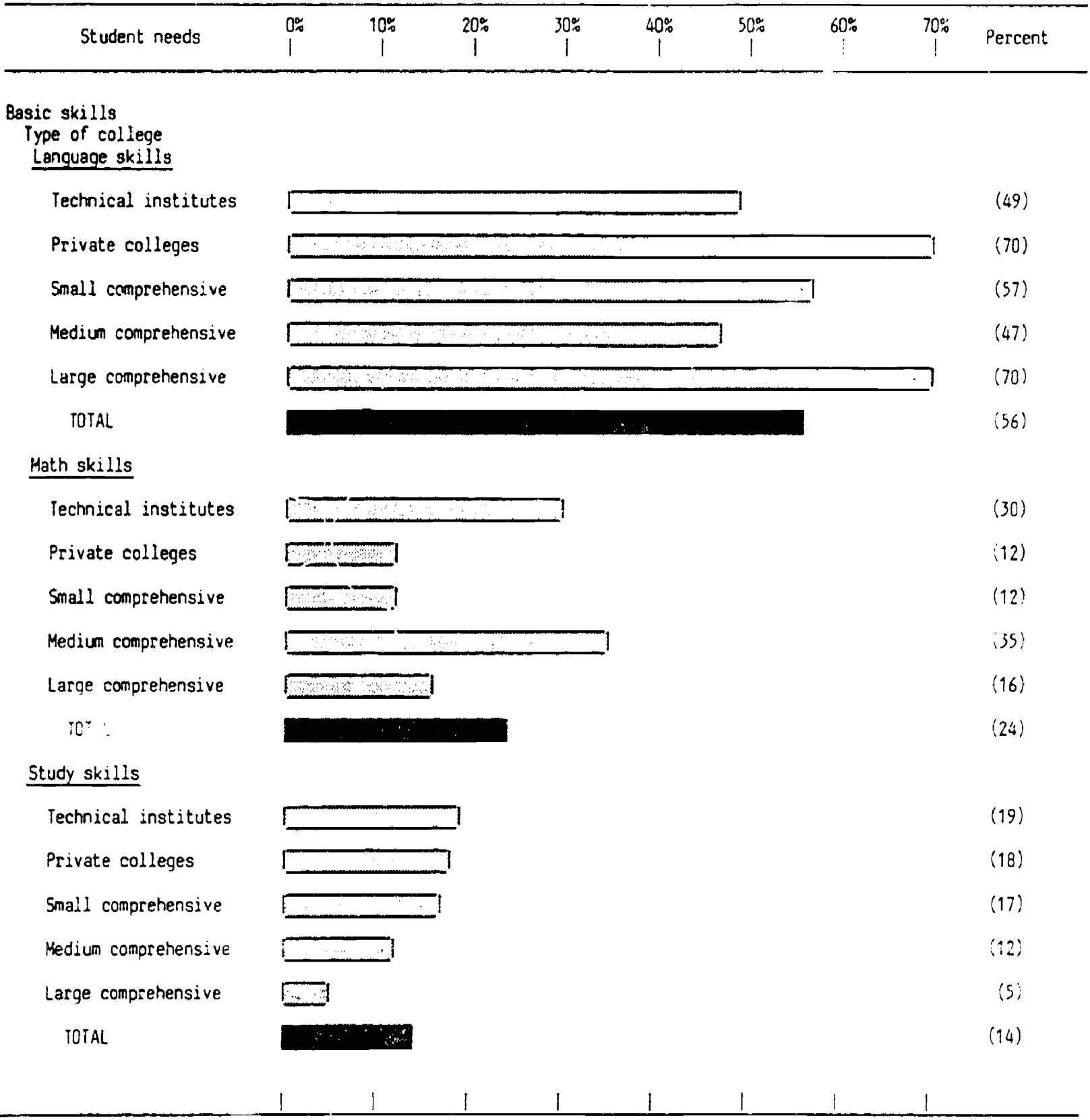


Figure IQ-13(1). Percent distribution of administrators indicating highest priority student needs, by type of need and type of college (continued)

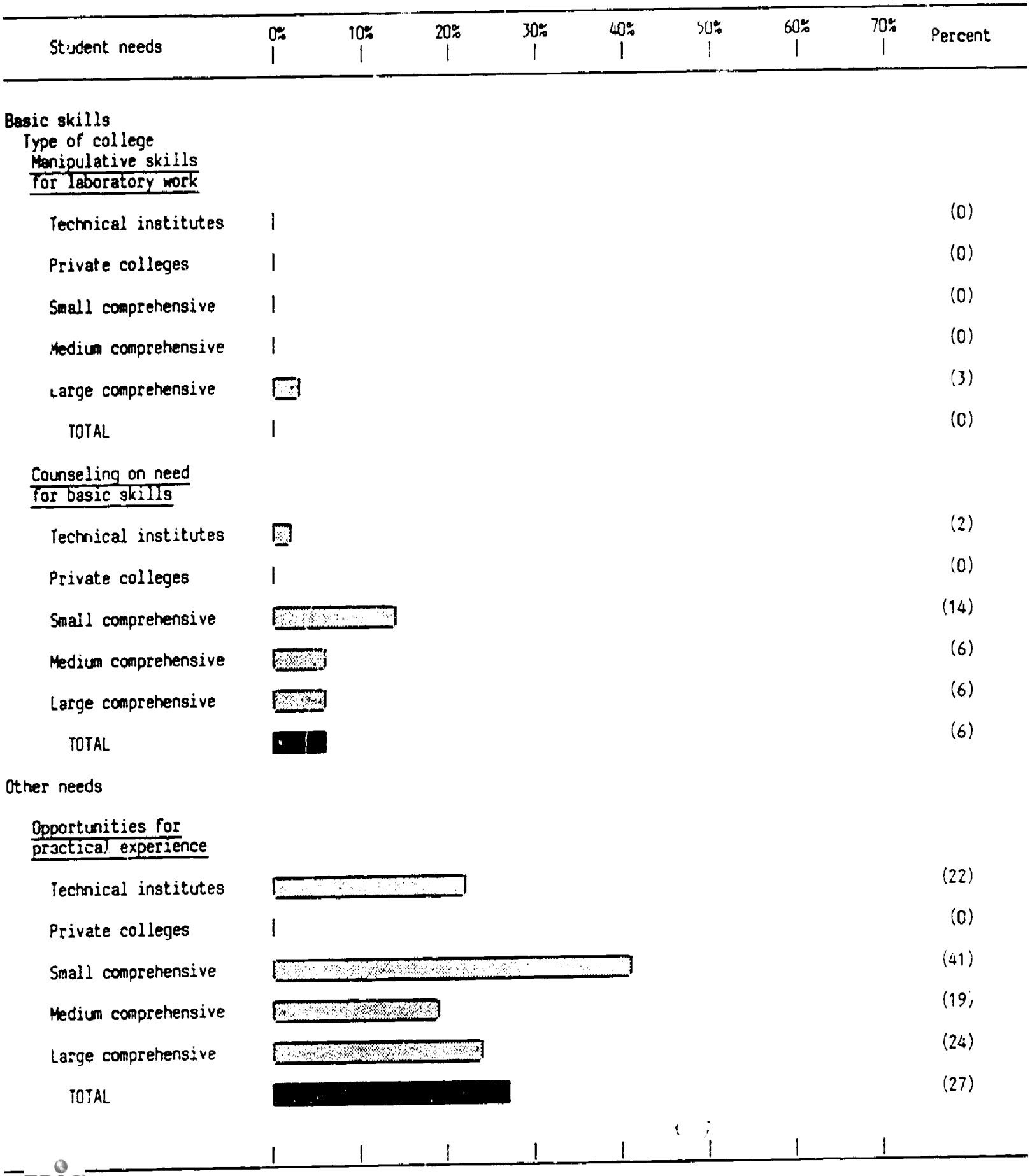


Figure IQ-13(1). Percent distribution of administrators indicating highest priority student needs, by type of need and type of college (continued)

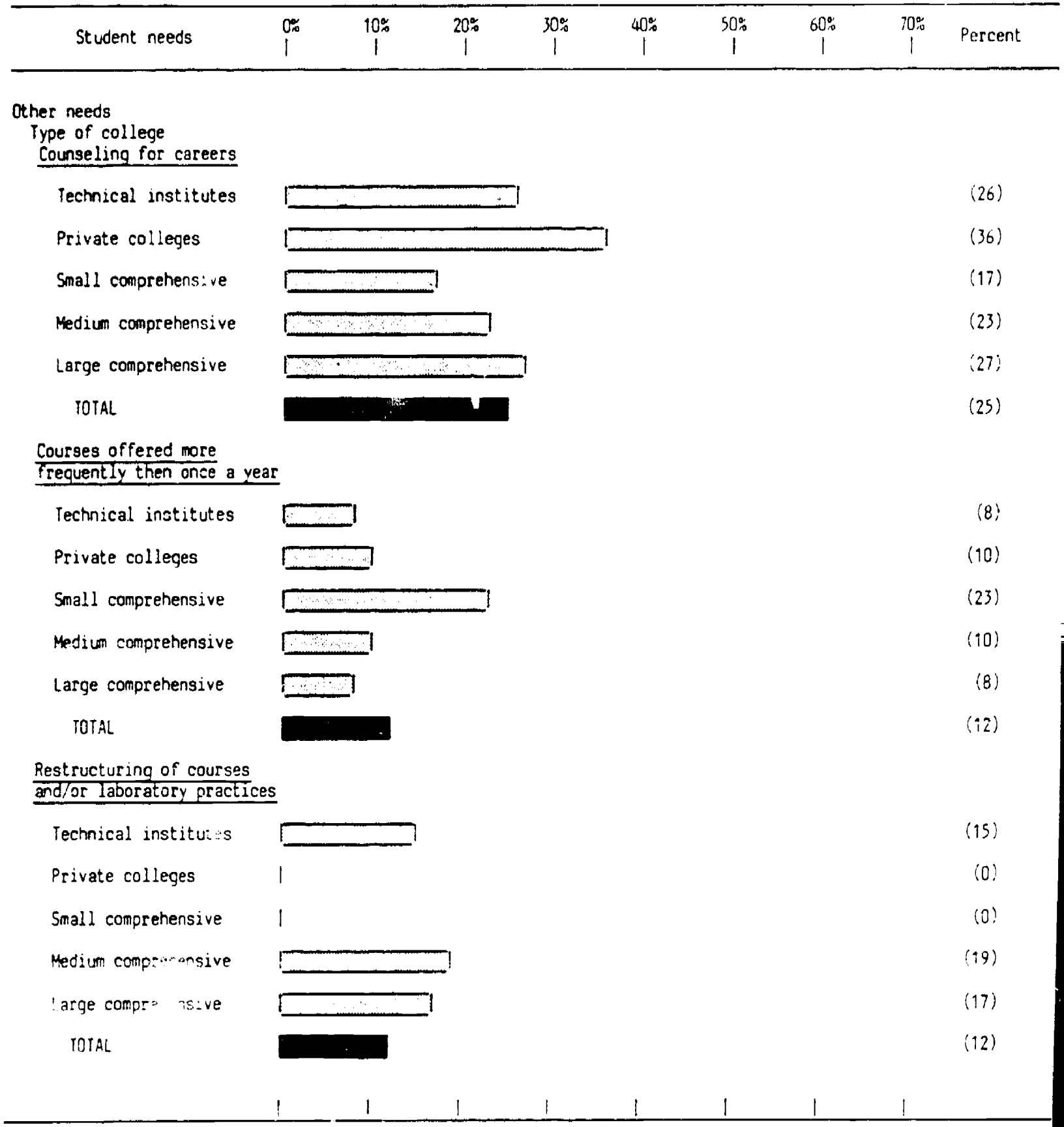


Figure IQ-13(1). Percent distribution of administrators indicating highest priority student needs, by type of need and type of college (continued)

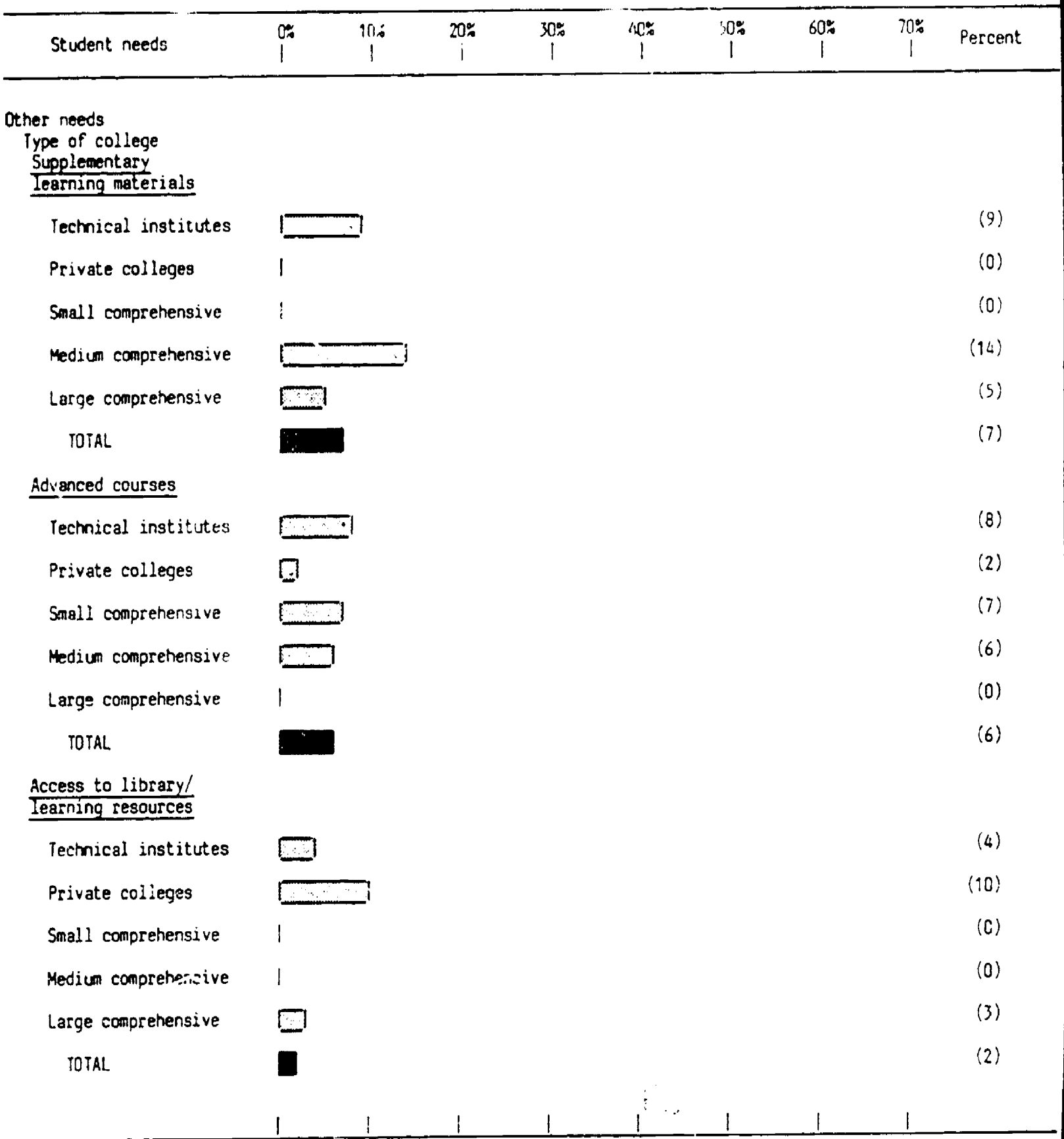


Figure IQ-13(1). Percent distribution of administrators indicating highest priority student needs, by type of need and type of college (continued)

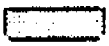
Student needs	0% 10% 20% 30% 40% 50% 60% 70%	Percent
Other needs		
Type of college		
Access to laboratories		
Technical institutes		(6)
Private colleges		(0)
Small comprehensive		(0)
Medium comprehensive		(6)
Large comprehensive		(3)
TOTAL		(3)
Access to faculty		
Technical institutes		(0)
Private colleges		(0)
Small comprehensive		(7)
Medium comprehensive		(6)
Large comprehensive		(5)
TOTAL		(4)
Honors courses		
Technical institutes		(0)
Private colleges		(6)
Small comprehensive		(0)
Medium comprehensive		(3)
Large comprehensive		(3)
TOTAL		(2)

Figure IQ-12(2). Percent distribution of administrators indicating first, second, and third priority student needs, by type of college and type of need

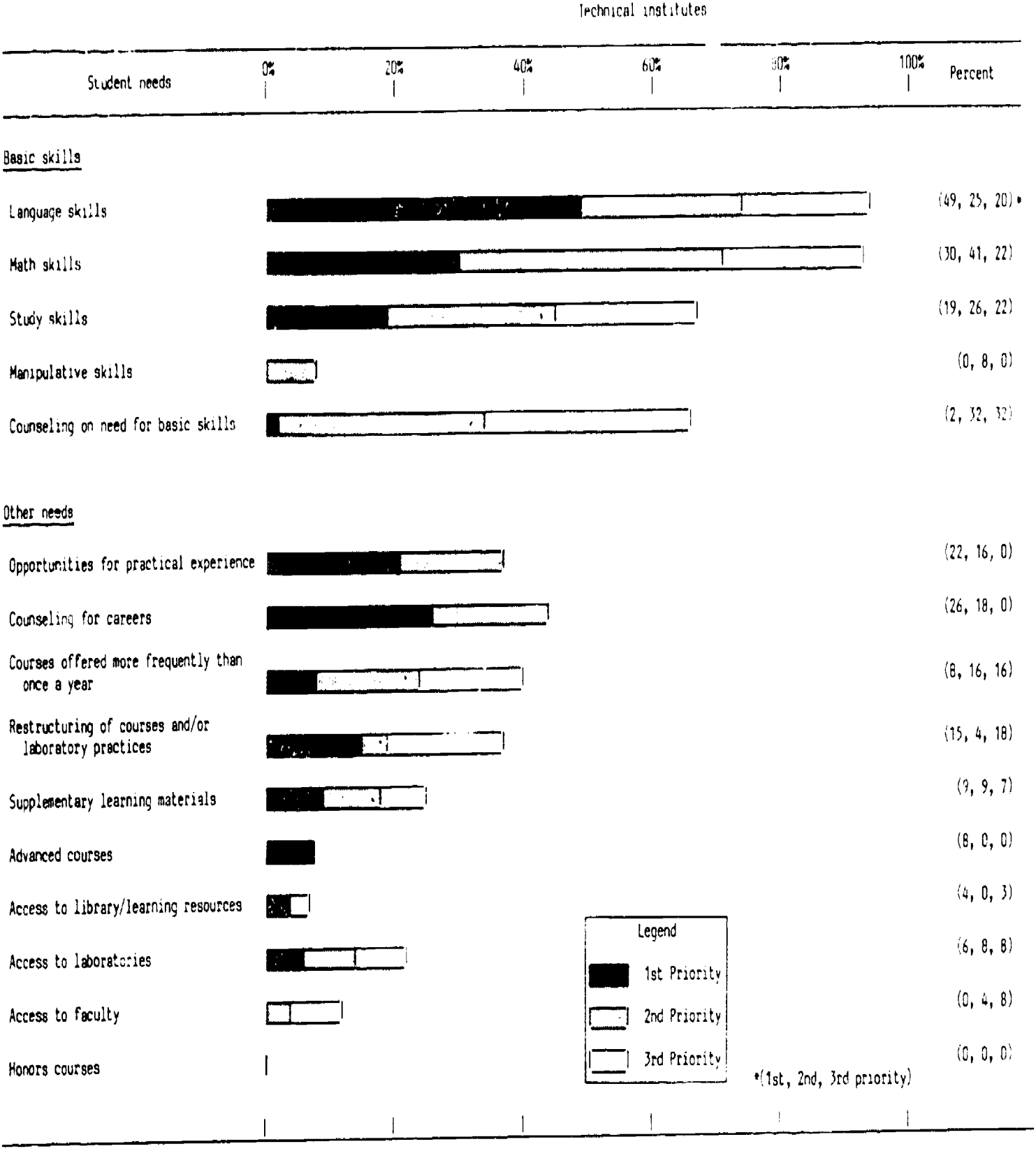


Figure IQ-13(.). Percent distribution of administrators indicating first, second, and third priority student needs, by type of college and type of need (continued)

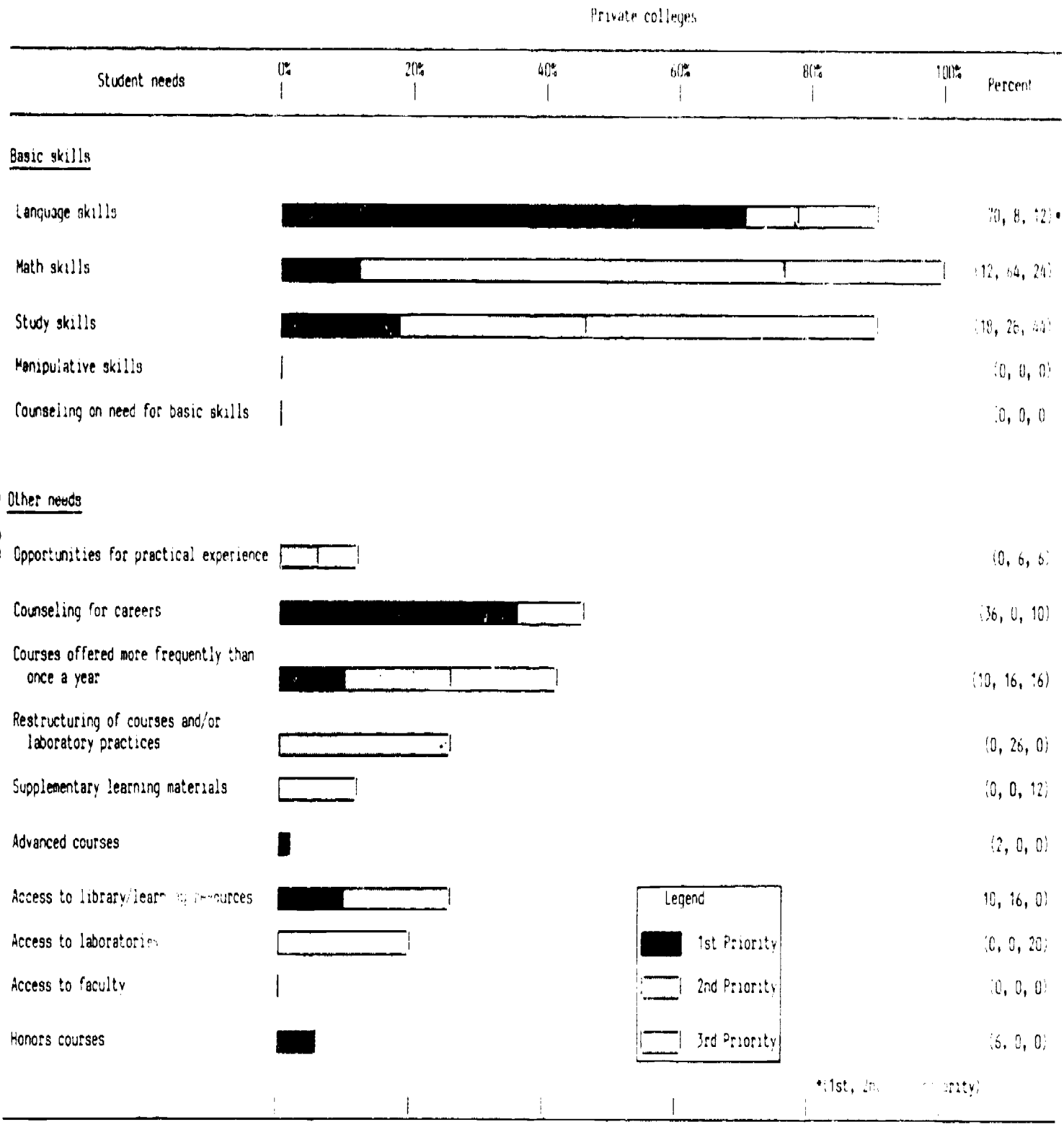


Figure IQ-13(2). Percent distribution of administrators indicating first, second, and third priority student needs, by type of college and type of need (continued)

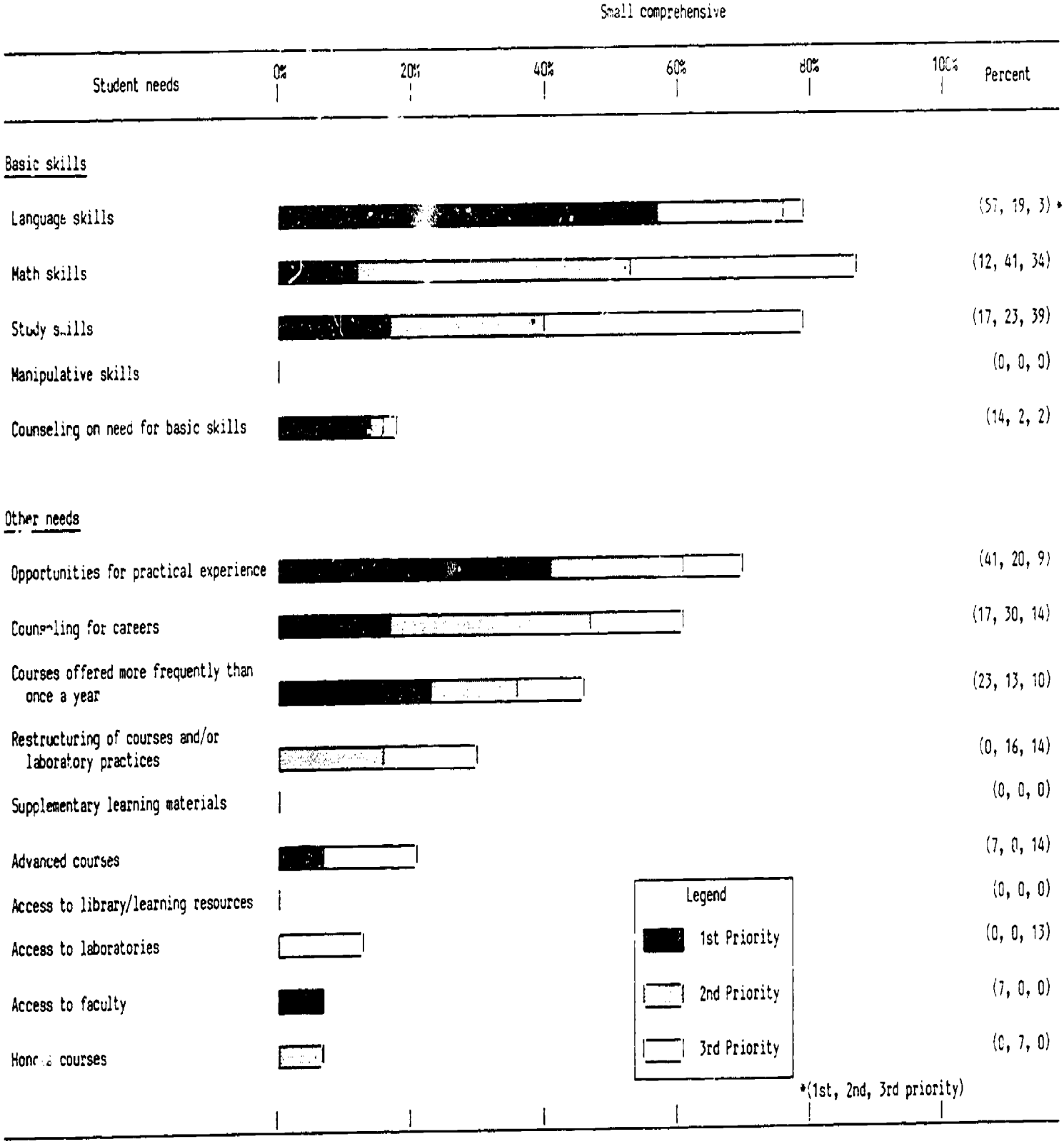


Figure IQ-13(2). Percent distribution of administrators indicating first, second, and third priority student needs, by type of college and type of need (continued)

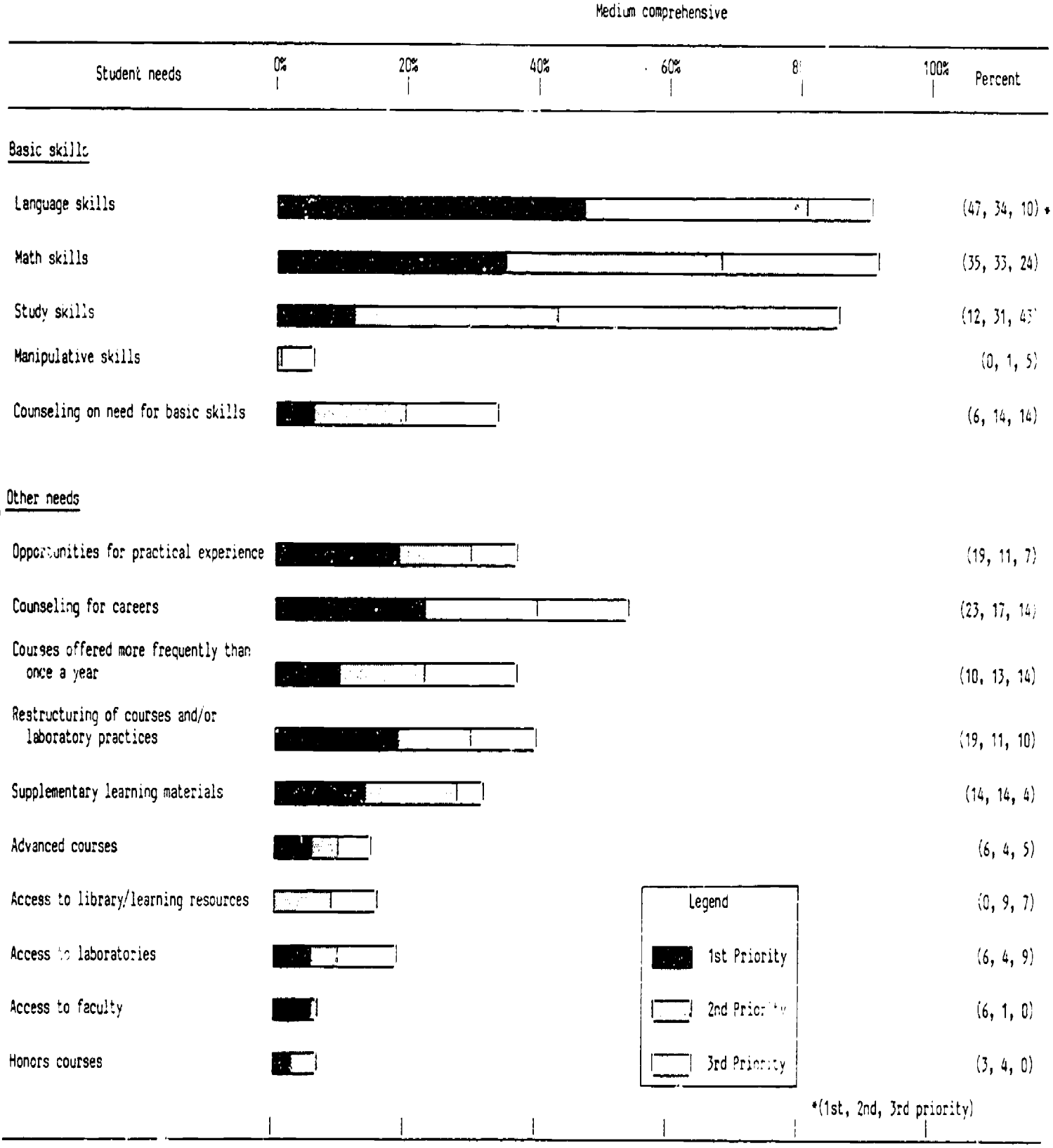


Figure IQ-13(2). Percent distribution of administrators indicating first, second, and third priority student needs, by type of college and type of need (continued)

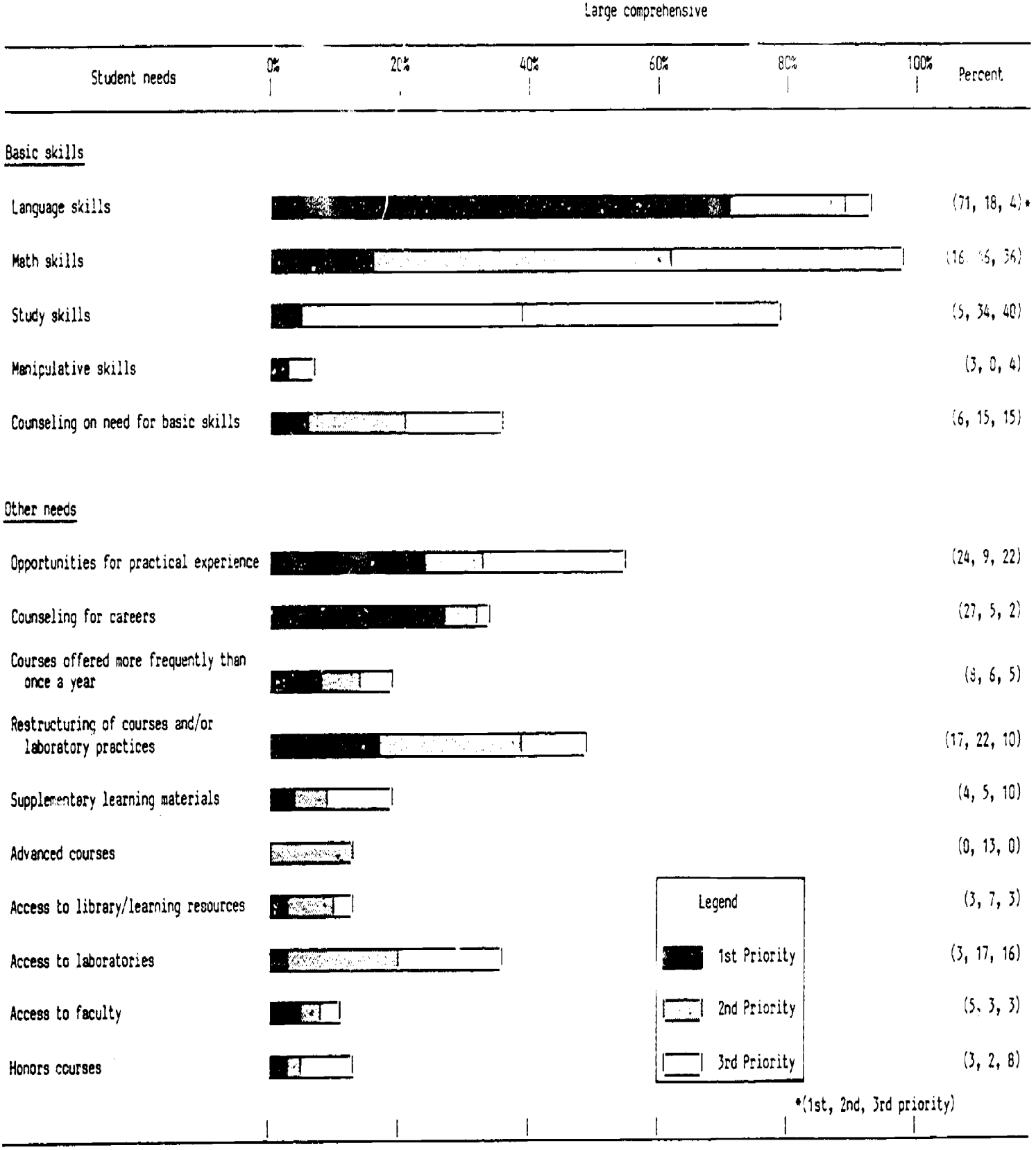
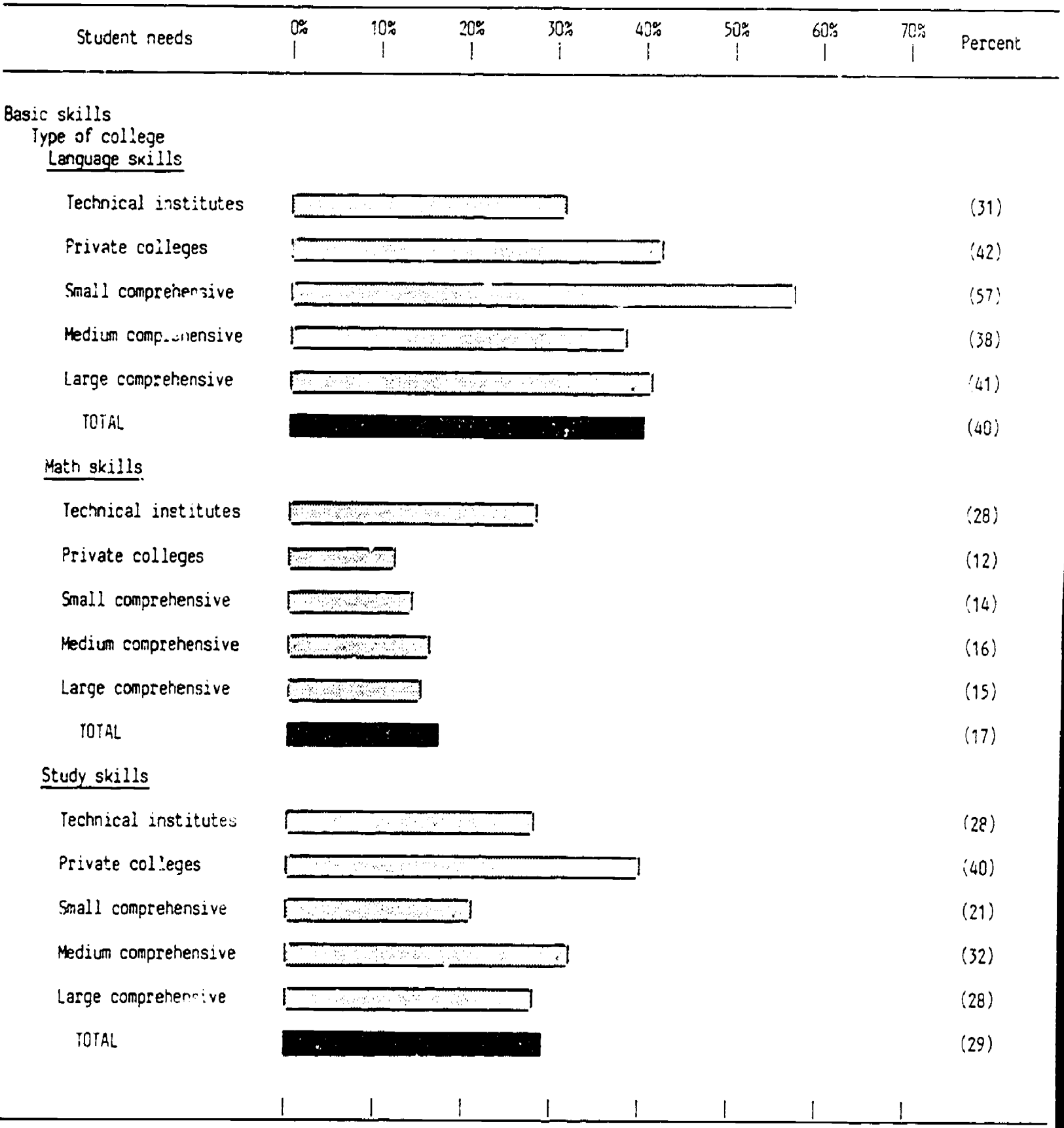


Figure FQ-24(1). Percent distribution of faculty indicating highest priority student needs, by type of need and type of college



igure FQ-24(1). Percent distribution of faculty indicating highest priority student needs, by type of need and type of college (continued)

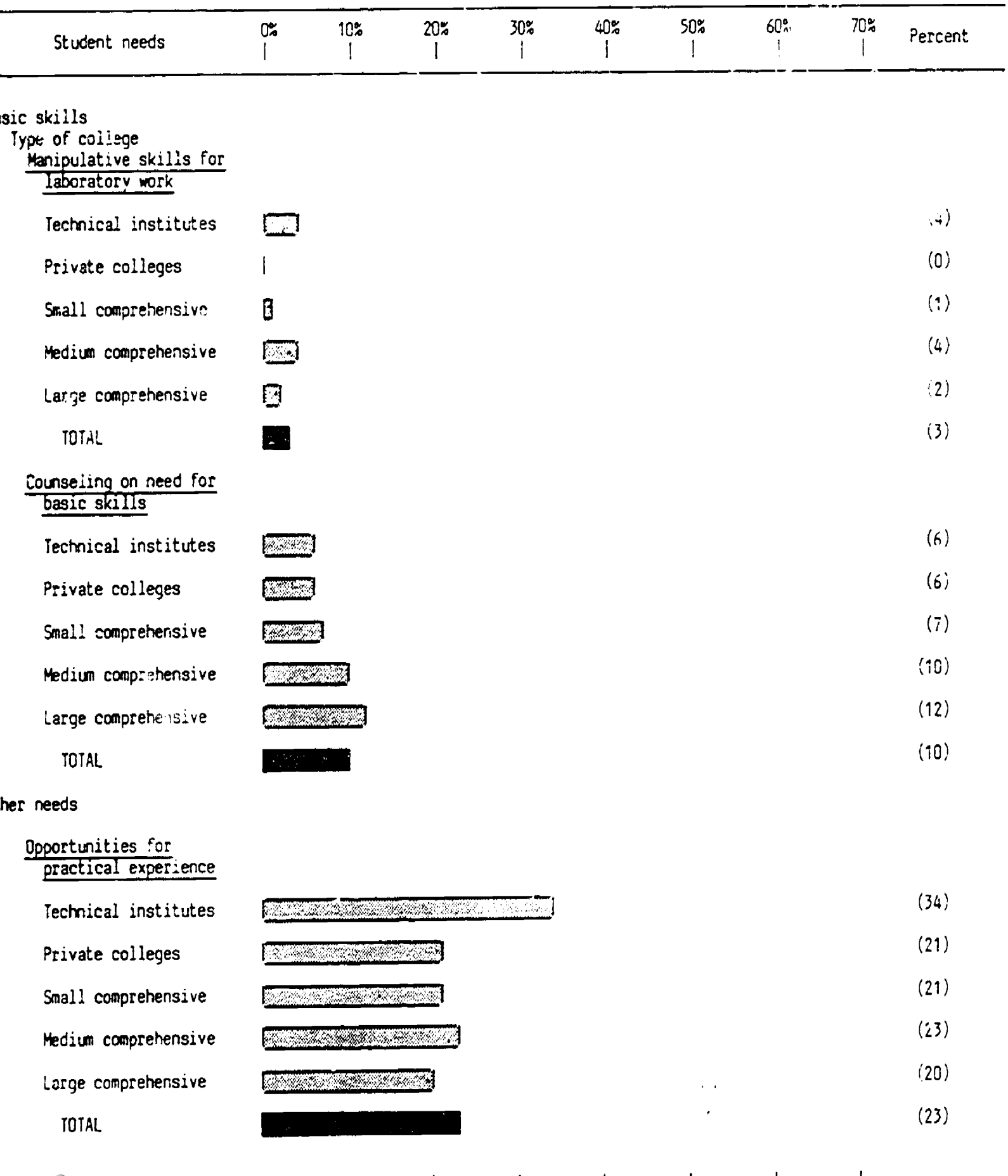


Figure FQ-24(1). Percent distribution of faculty indicating highest priority student needs, by type of need and type of college (continued

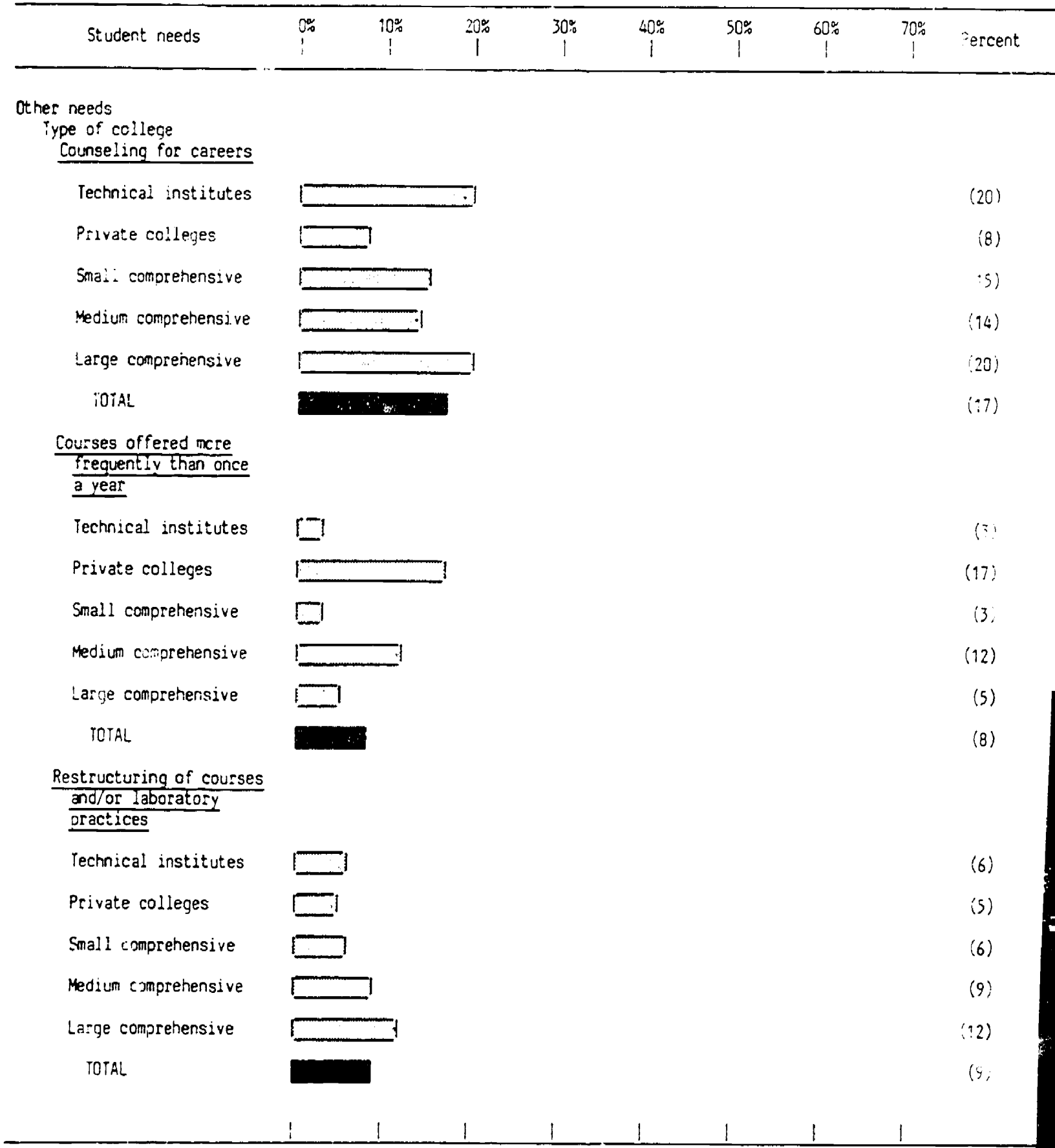


Figure FC-24(1). Percent distribution of faculty indicating highest priority student needs, by type of need and type of college (continued)

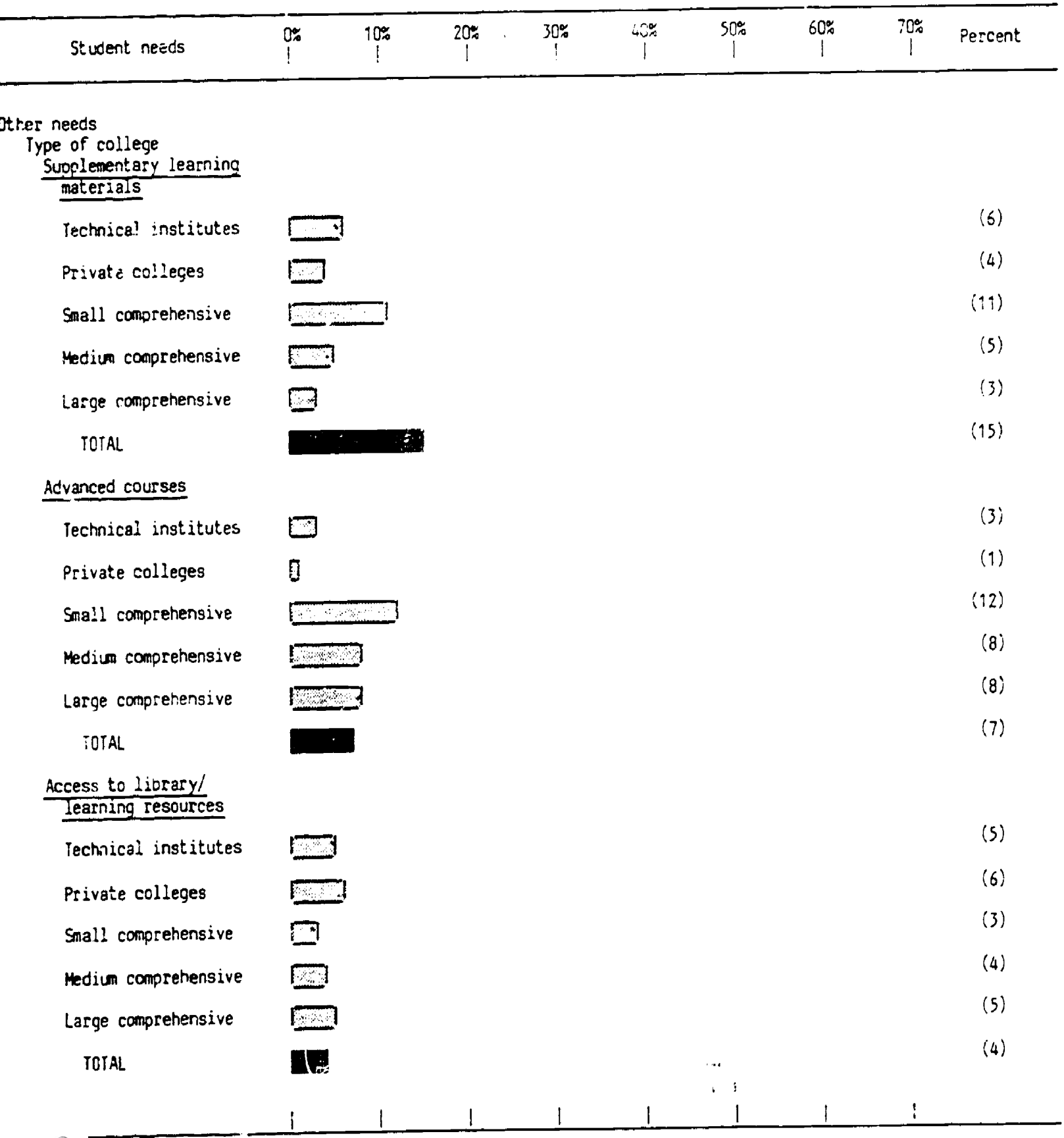


Figure FQ-24(1). Percent distribution of faculty indicating highest priority student needs, by type of need and type of college (continued)

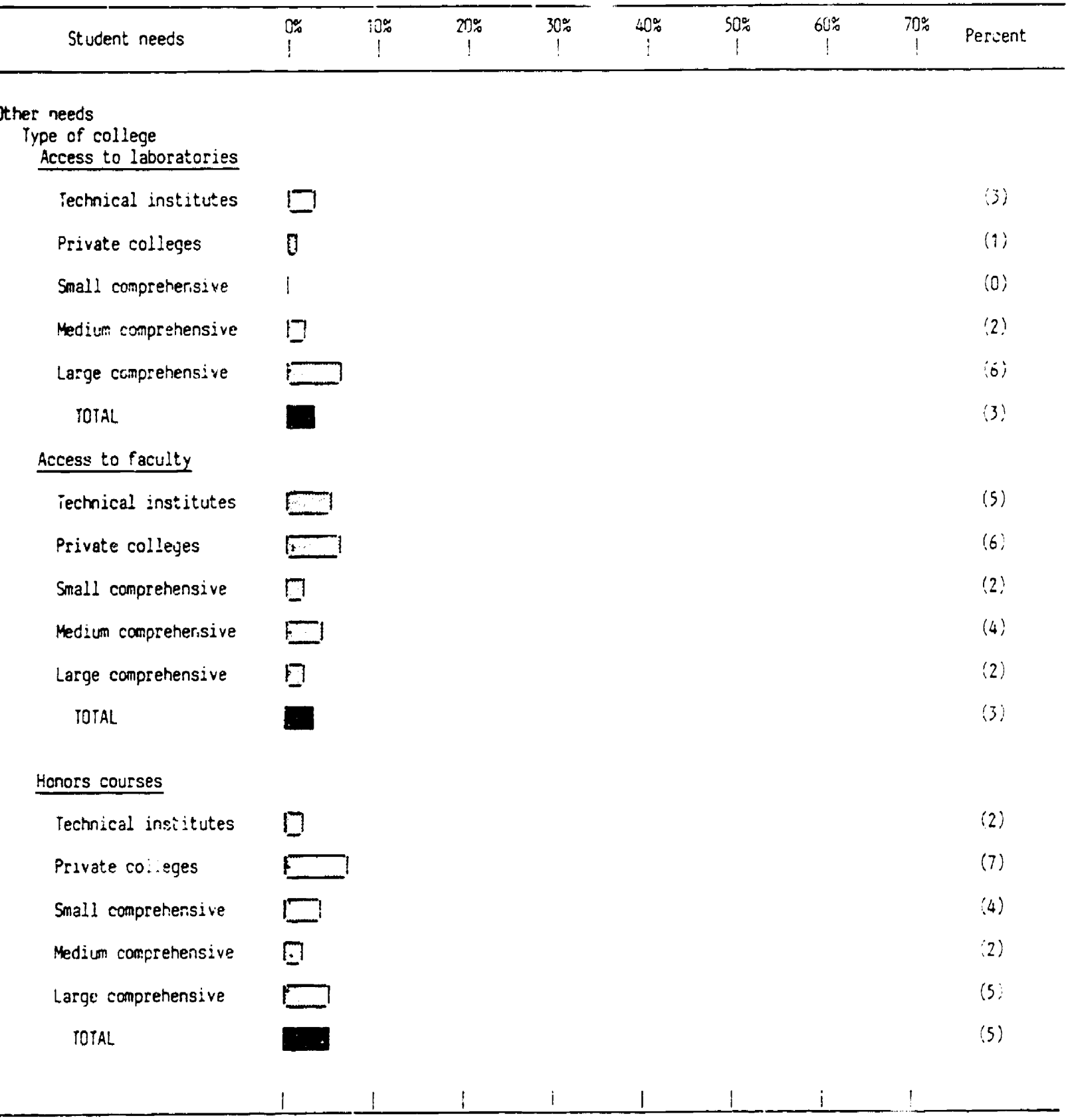


Figure FQ-24(2). Percent distribution of faculty indicating highest priority student needs, by type of need and educational field

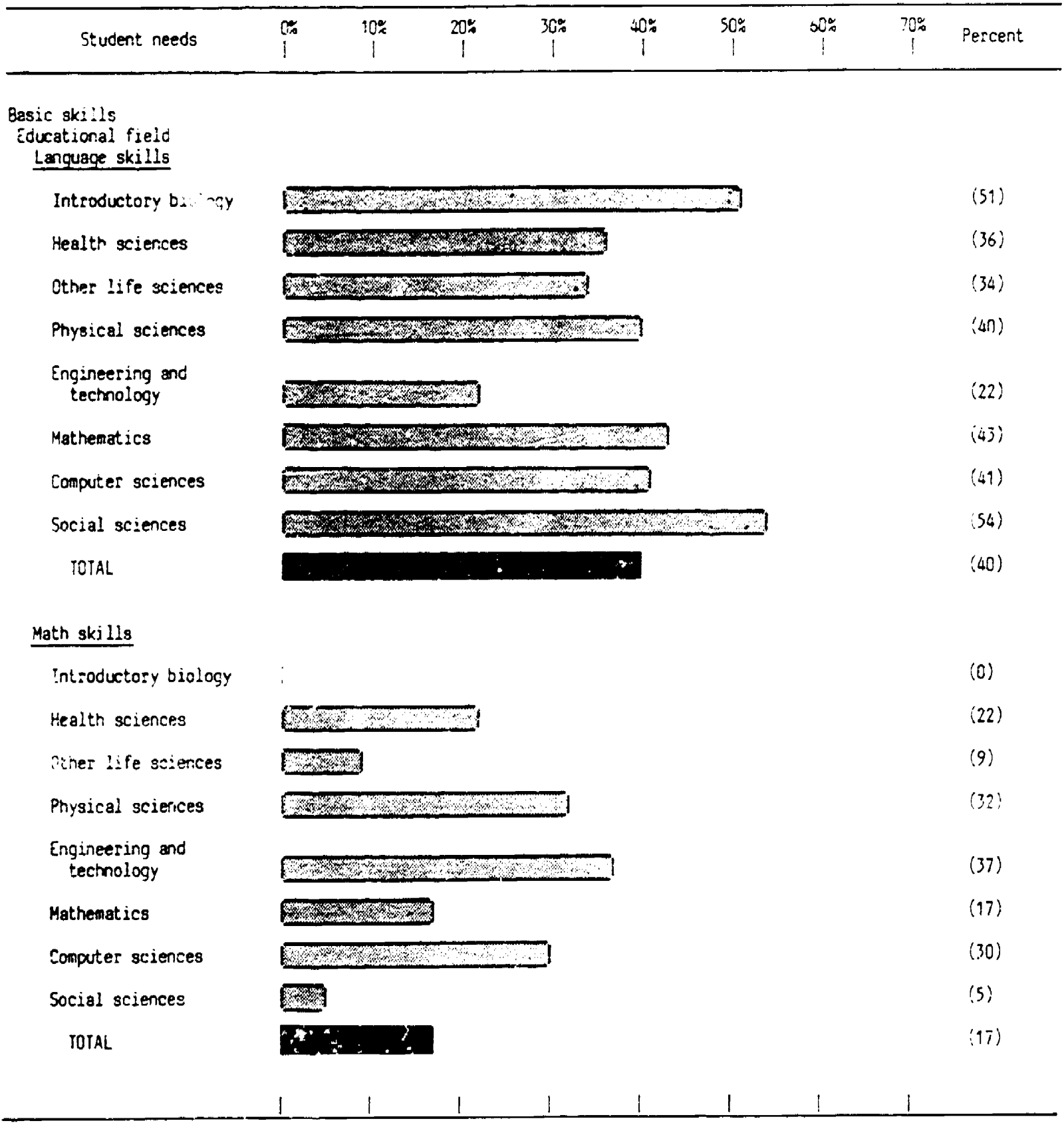


Figure FQ-24(2). Percent distribution of faculty indicating highest priority student needs, by type of need and educational field (continued

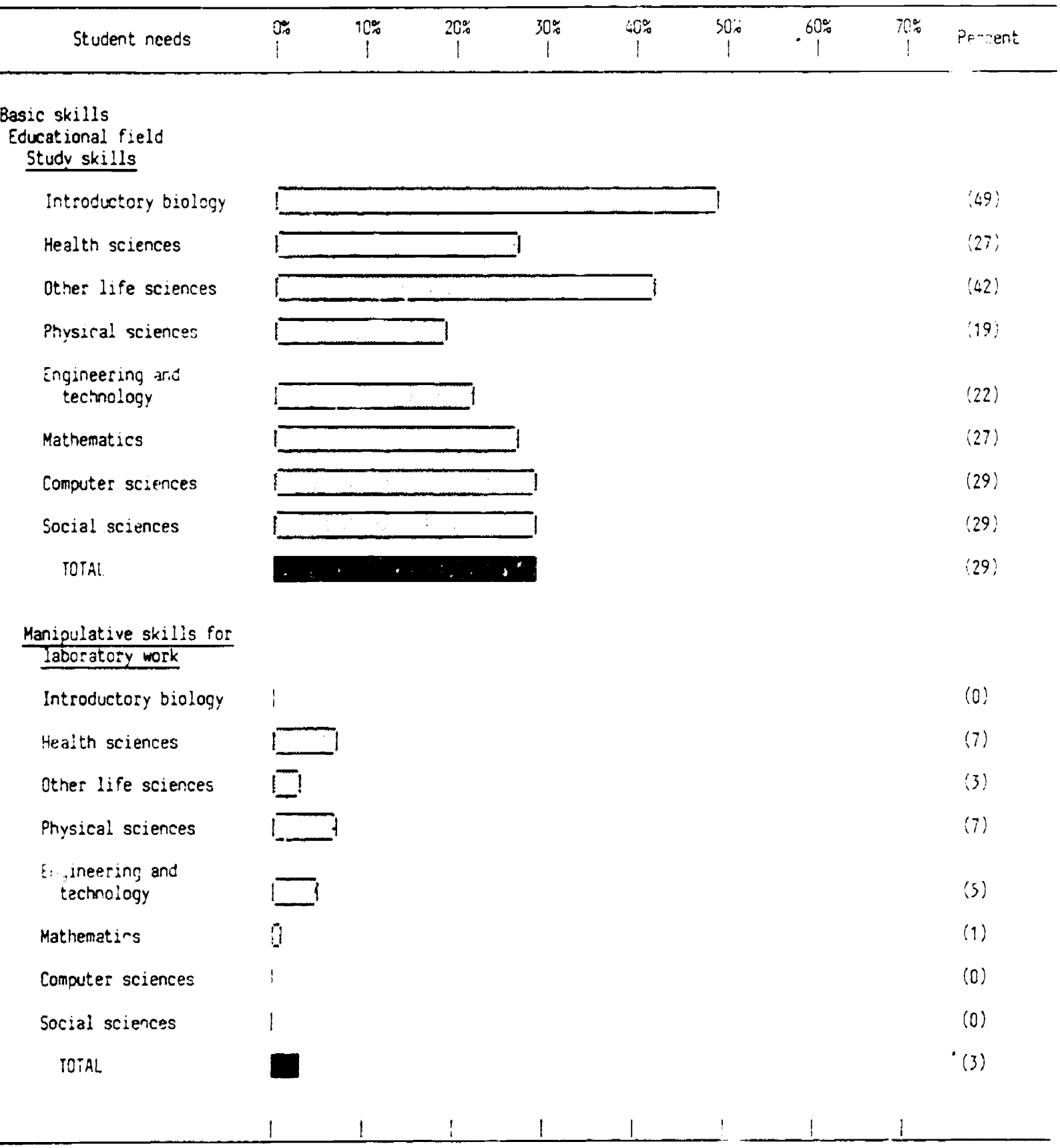


Figure FQ-24(2). Percent distribution of faculty indicating highest priority student needs, by type of need and educational field (continu

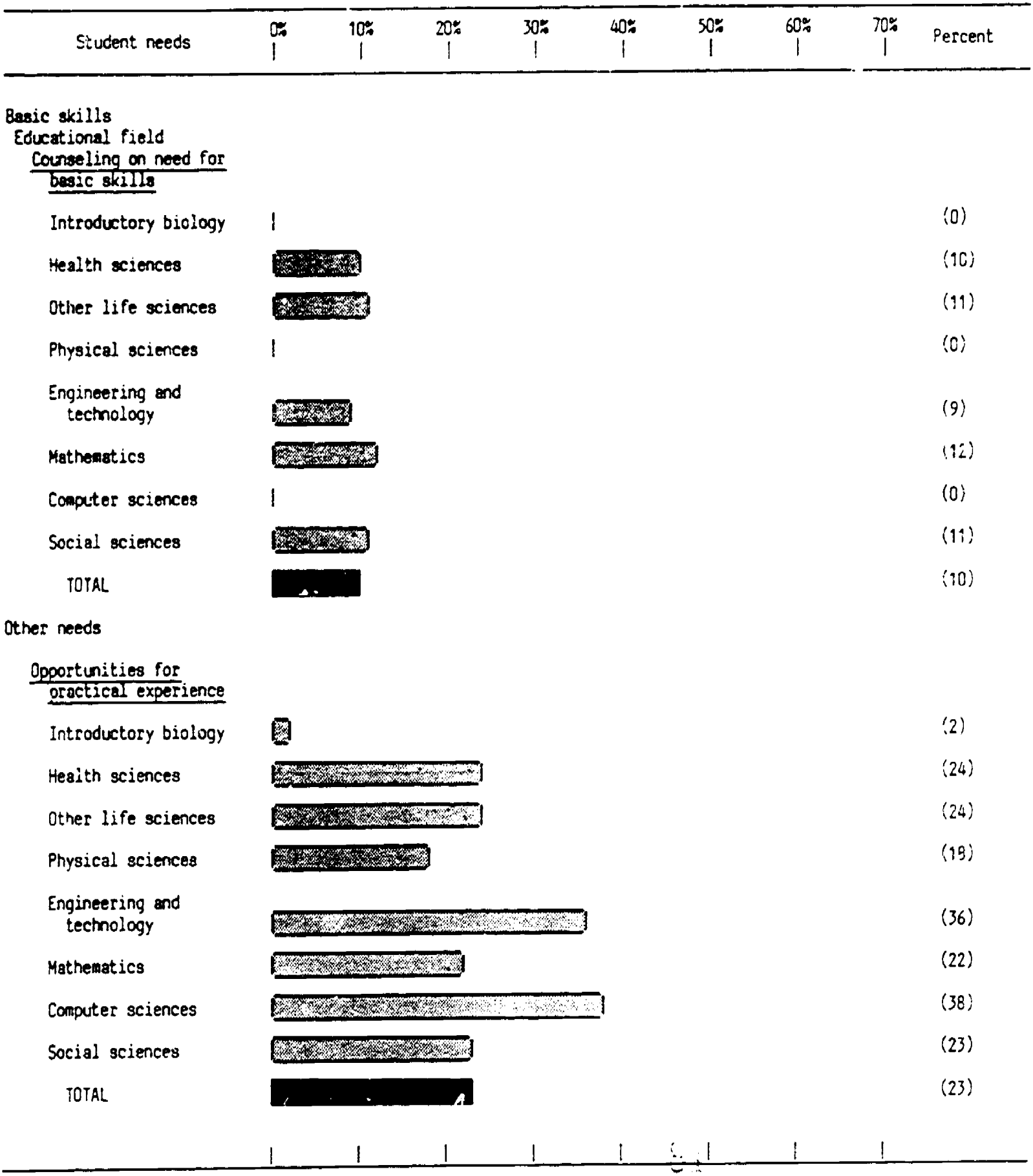


Figure FQ-24(2). Percent distribution of faculty indicating highest priority student needs, by type of need and educational field (continued)

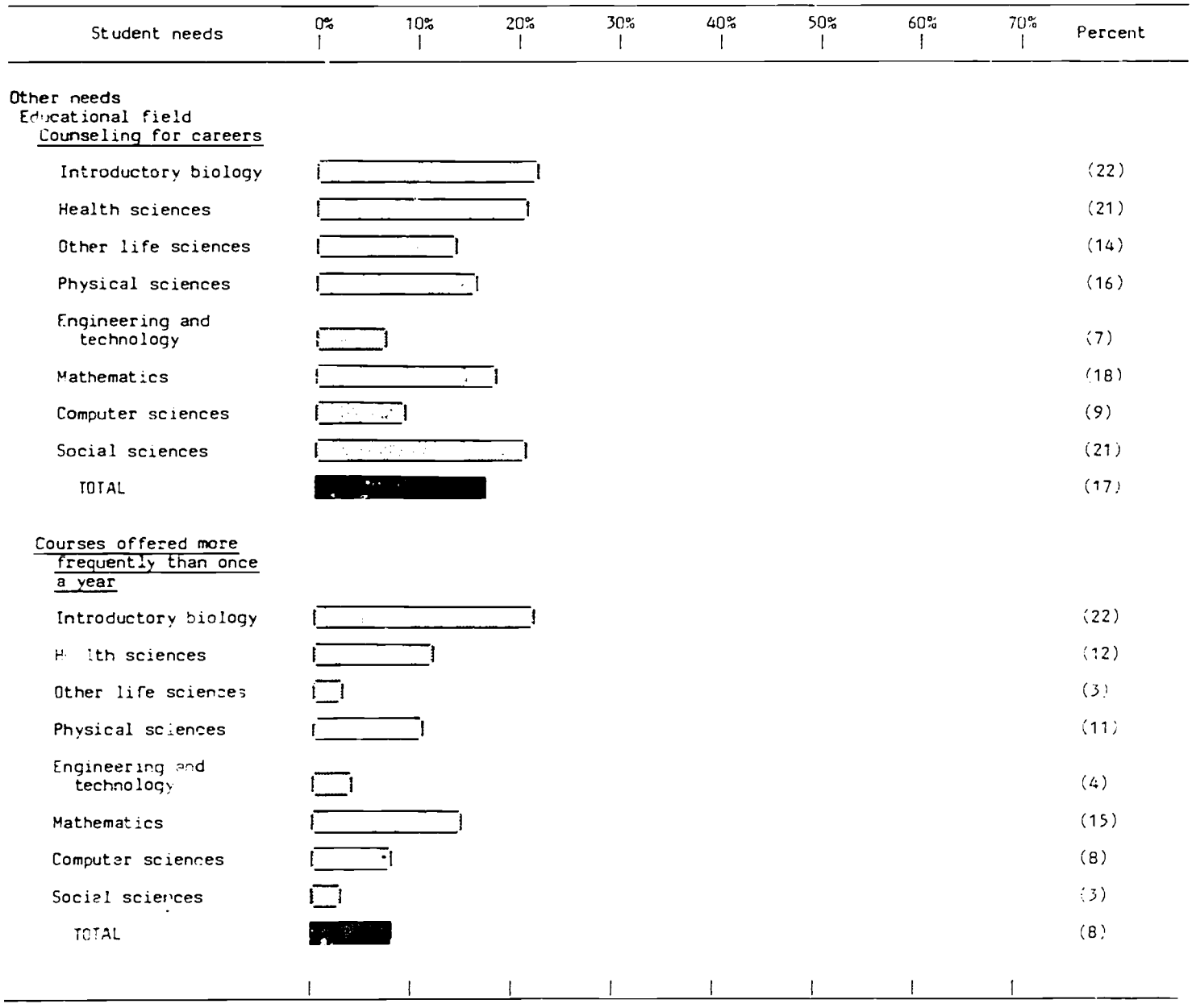


Figure FQ-2-(2). Percent distribution of faculty indicating highest priority student needs, by type of need and educational field (continued

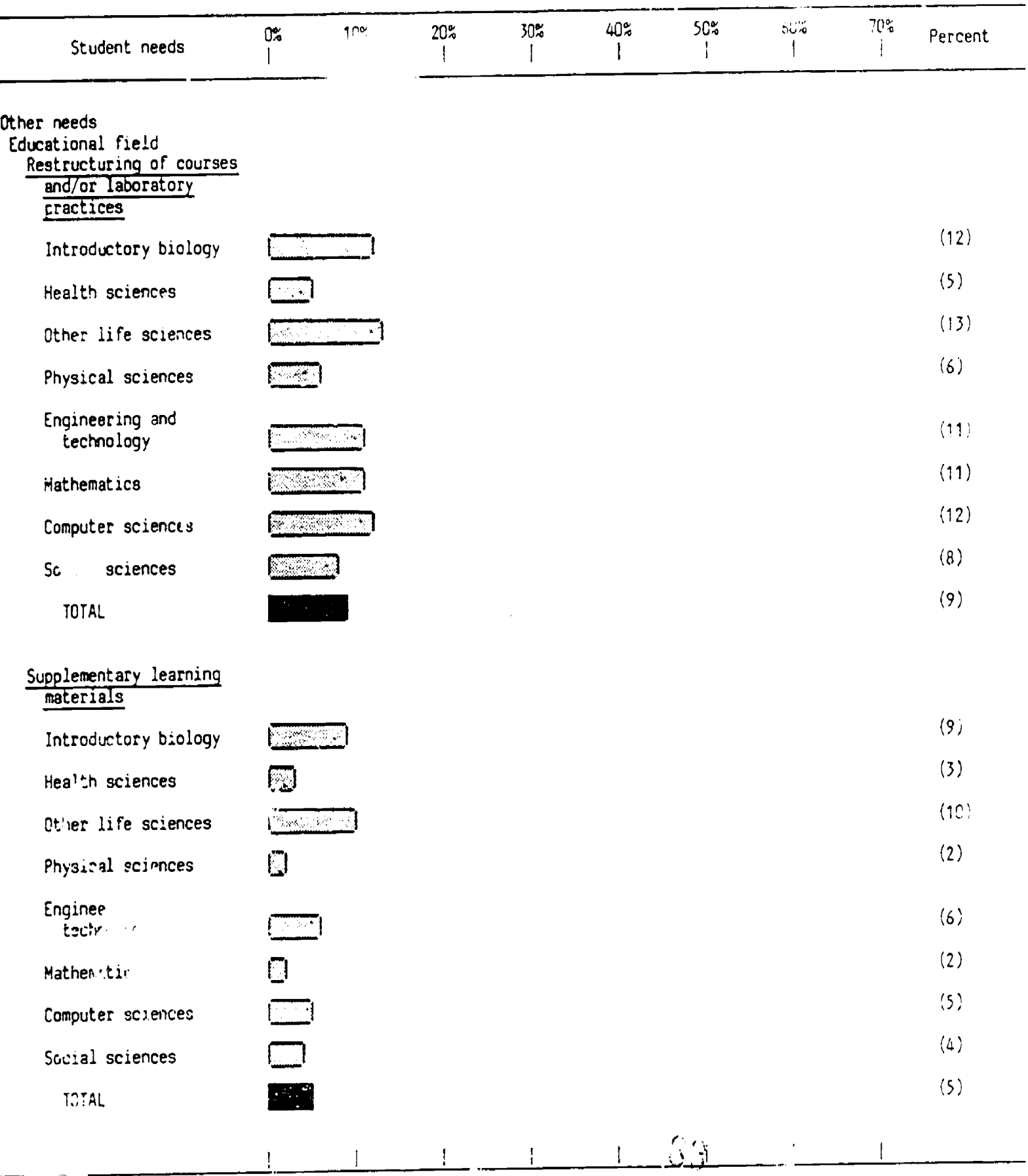
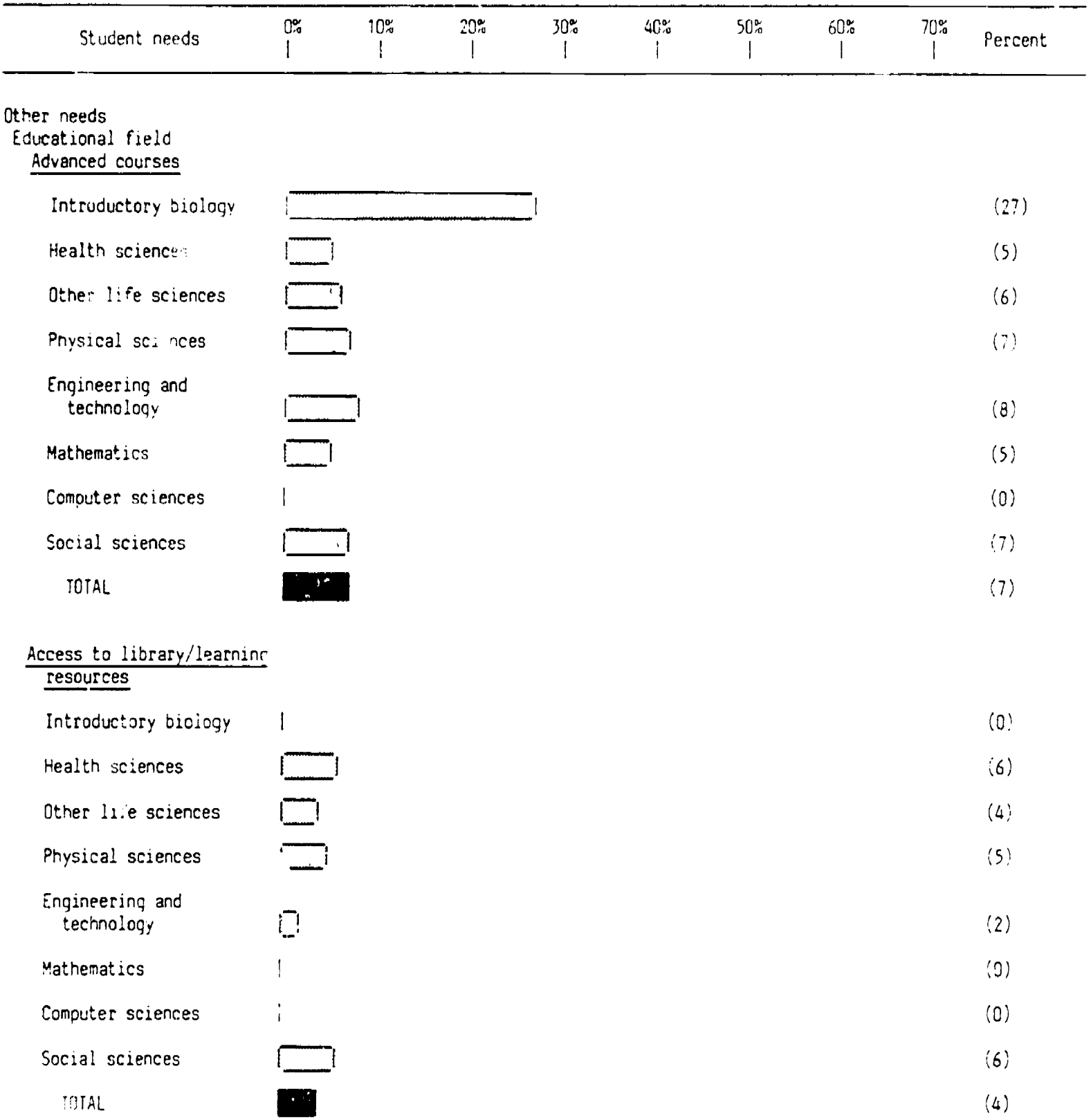


Figure FQ-24(2). Percent distribution of faculty indicating highest priority student needs, by type of need and educational field (continu



igure FQ-24(2). Percent distribution of faculty indicating highest priority student needs, by type of need and educational field (continued)

Student needs	0% | 10% | 20% | 30% | 40% | 50% |]% | 70%	Percent
her needs		
ducational field		
Access to laboratories		
Introductory biology		(0)
Health sciences		(5)
Other life sciences		(2)
Physical sciences		(3)
Engineering and technology		(3)
Mathematics		(1)
Computer sciences		(0)
Social sciences		(1)
TOTAL		(3)
Access to faculty		
Introductory biology		(0)
Health sciences		(4)
Other life sciences		3)
Physical sciences		(3)
Engineering and technology		(2)
Mathematics		(5)
Computer sciences		(10)
Social sciences		(3)
TOTAL		(3)

Figure FQ-24(2). Percent distribution of faculty indicating highest priority student needs, by type of need and educational field (contin

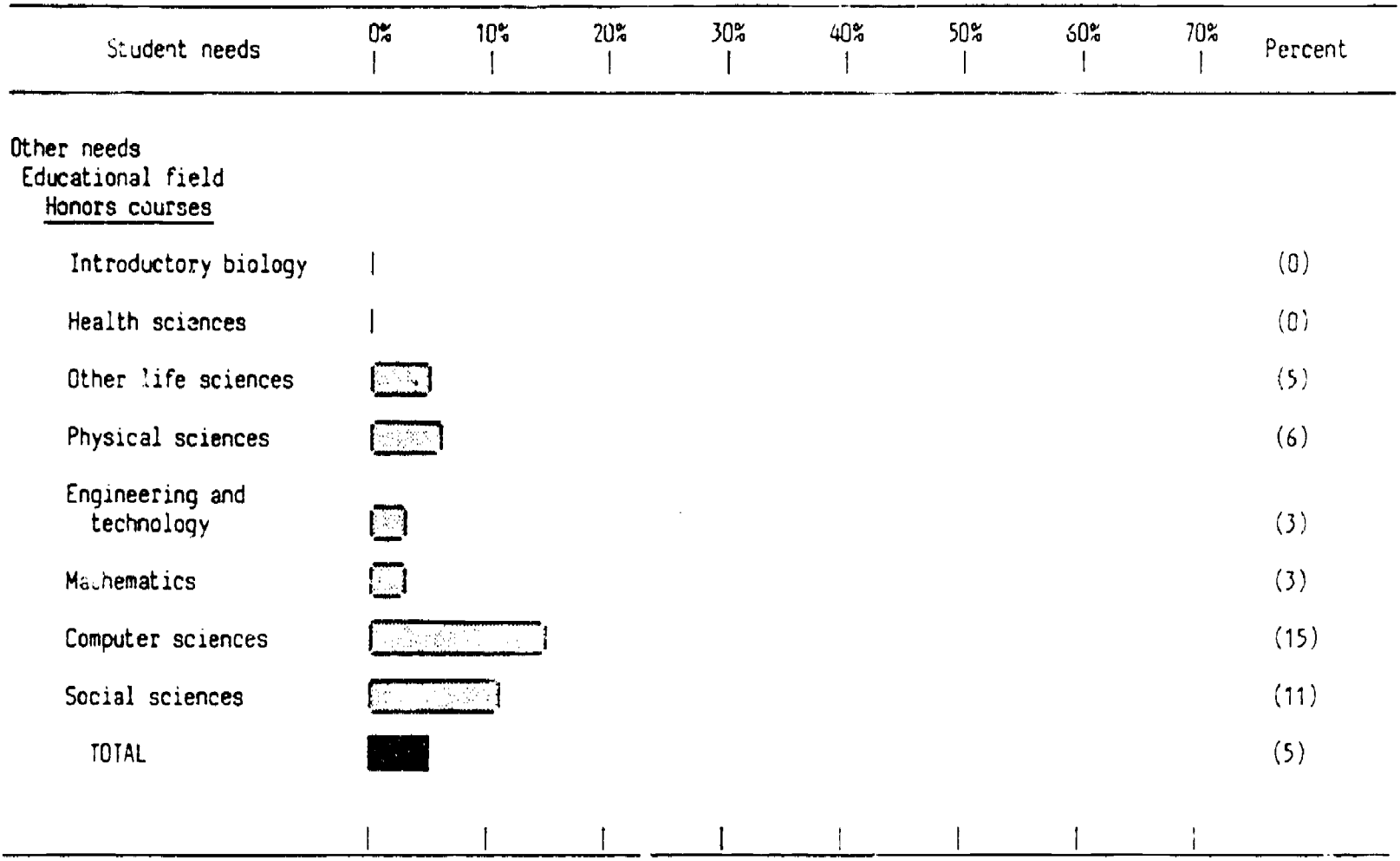


Figure FQ-24(3). Percent distribution of faculty indicating first, second, and third priority student needs, by type of college and type of need

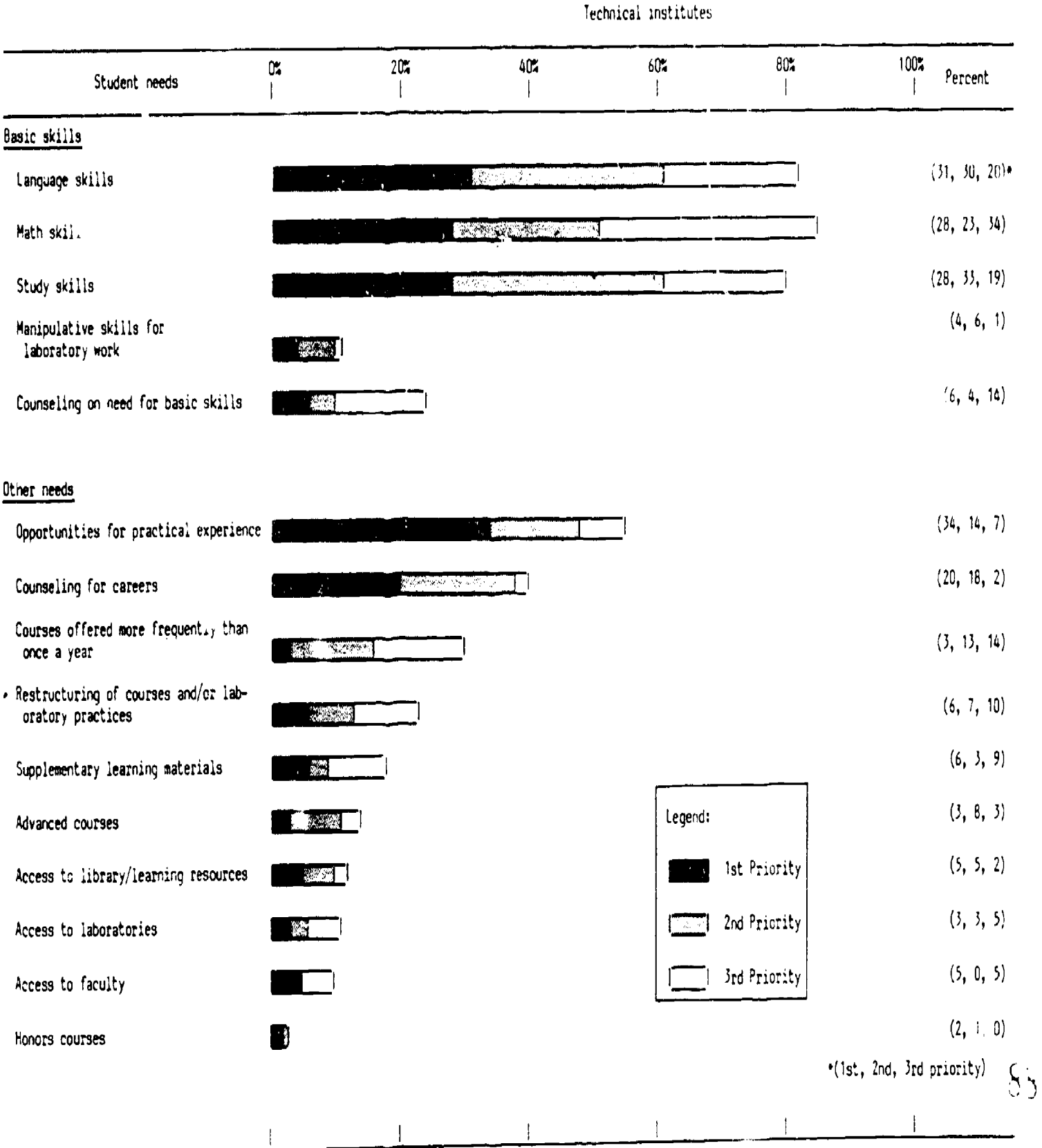


Figure FQ-24(3). Percent distribution of faculty indicating first, second, and third priority student needs, by type of college and type of need (continued)

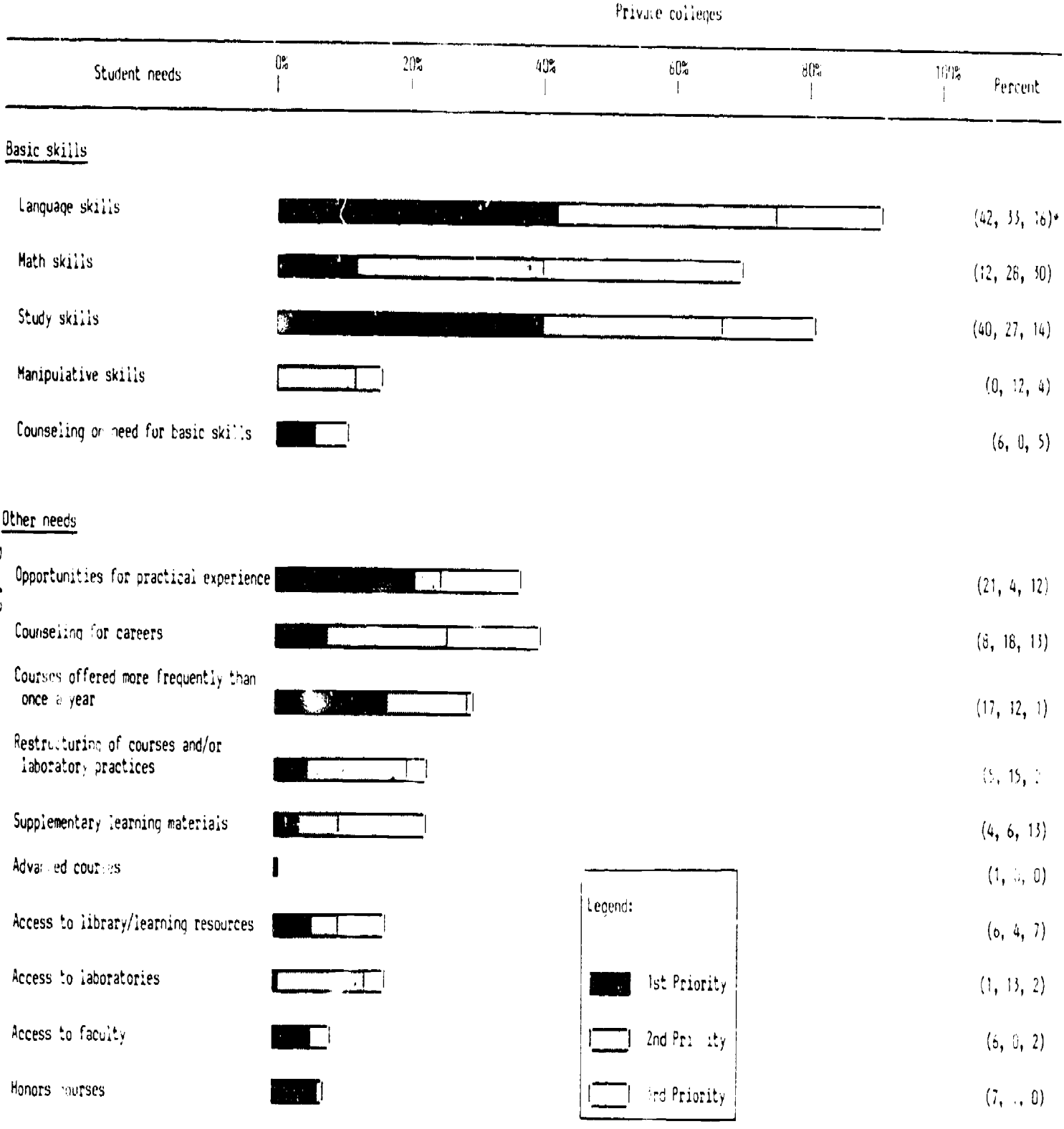


Figure FQ-24(3). Percent distribution of faculty indicating first, second, and third priority student needs, by type of college and type of need (continued)

Small comprehensive

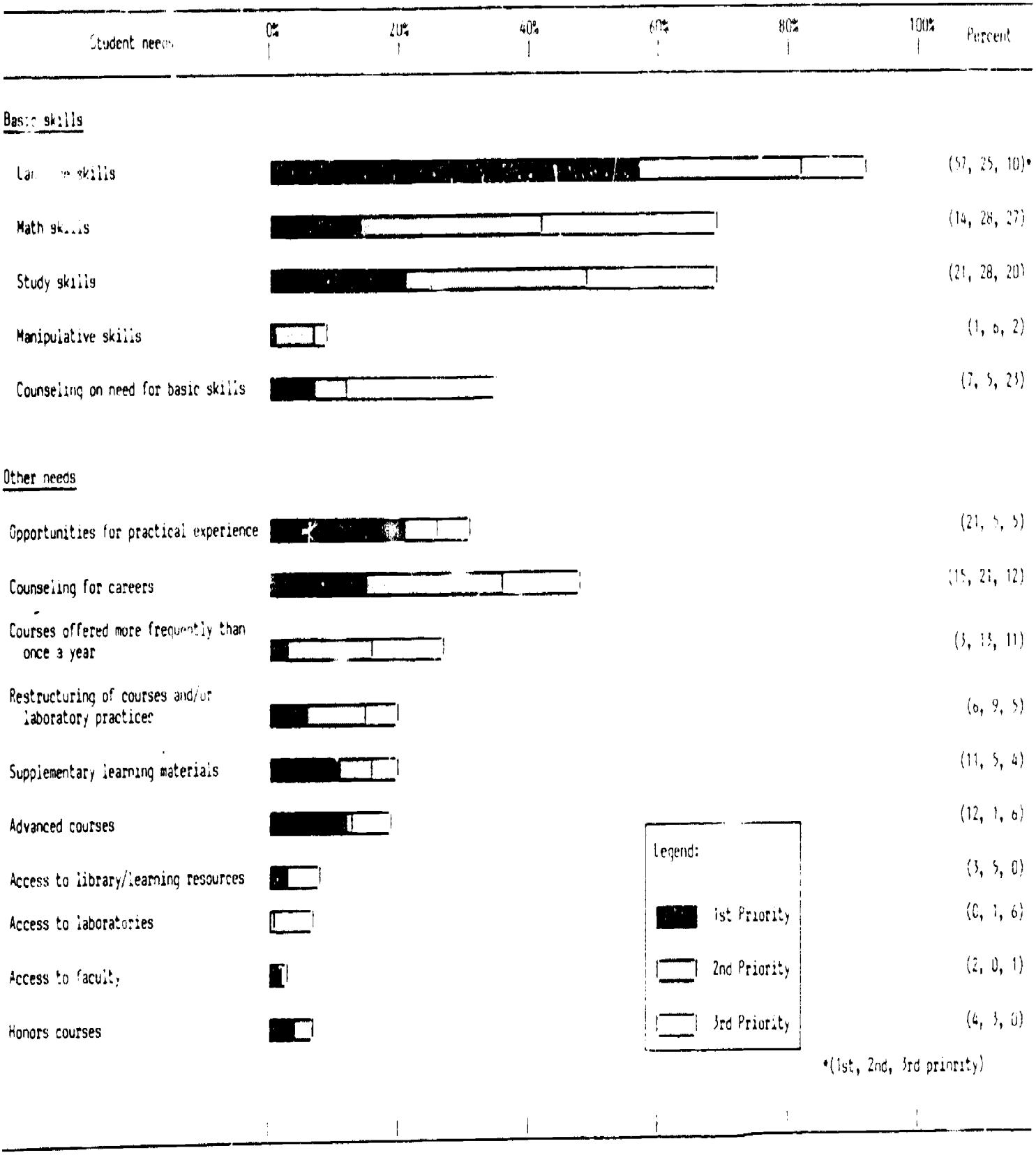
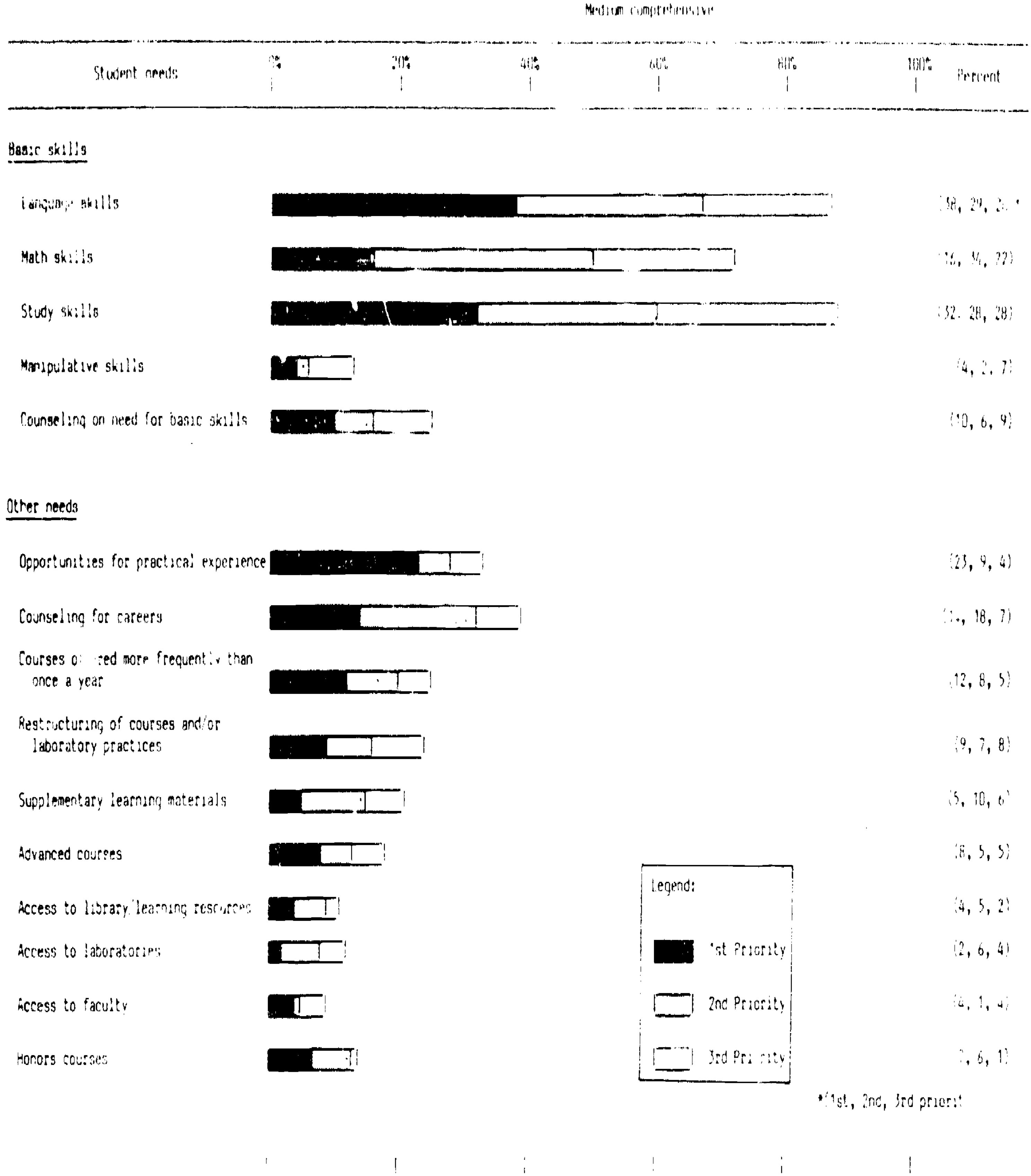


Figure FG-24(B). Percent distribution of faculty indicating first, second, and third priority student needs, by type of college and type of need (continued)



D-45

Figure FQ-24(3). Percent distribution of faculty indicating first, second, and third priority student needs, by type of college and type of need (continued)

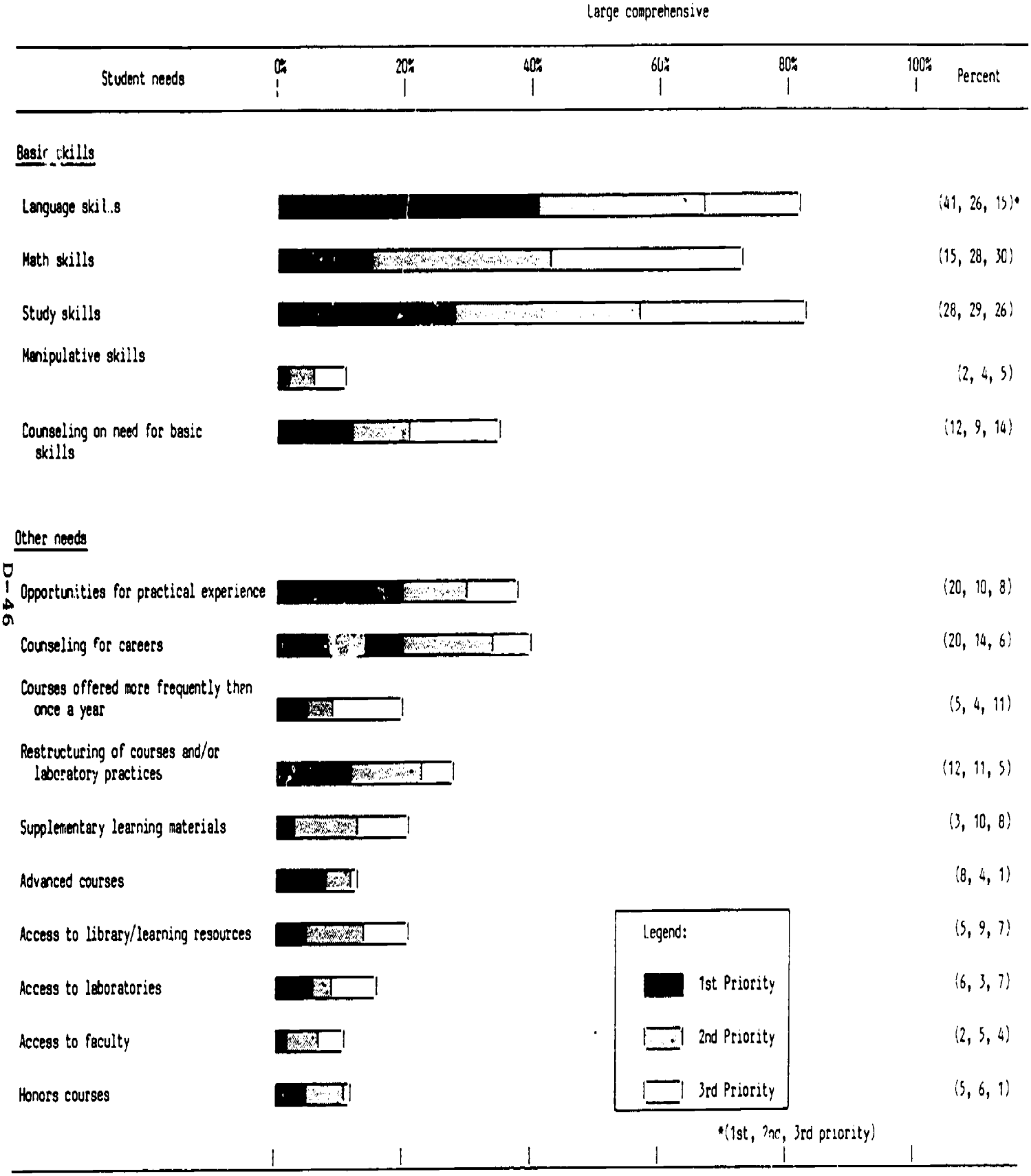
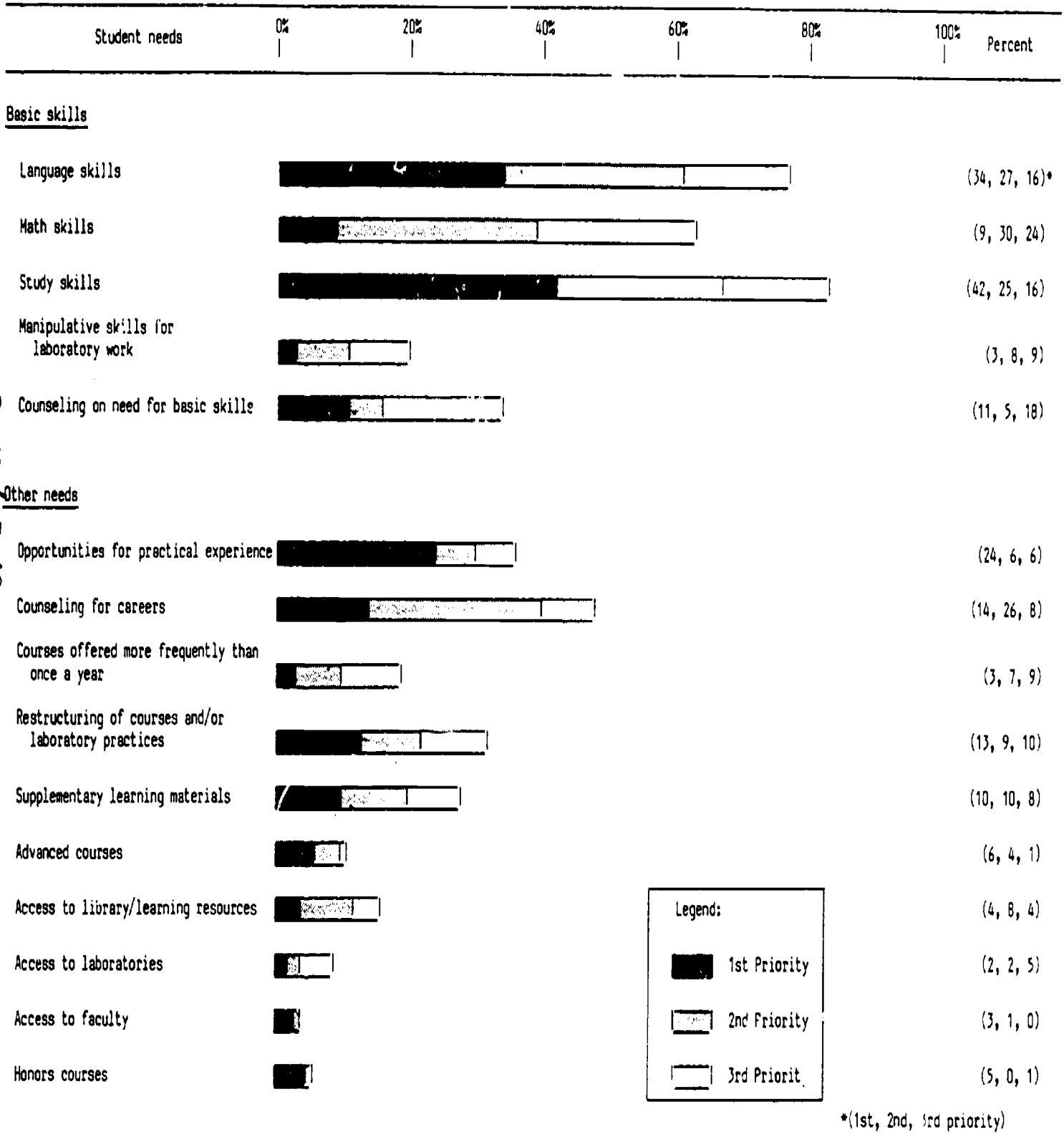


Figure FQ-24(4). Percent distribution of faculty indicating first, second, and third priority student needs, by educational field and type of need (continued)

Other life sciences



D-48

D-49

Figure FQ-24(4). Percent distribution of faculty indicating first, second, and third priority student needs, by educational field and type of need (continued)

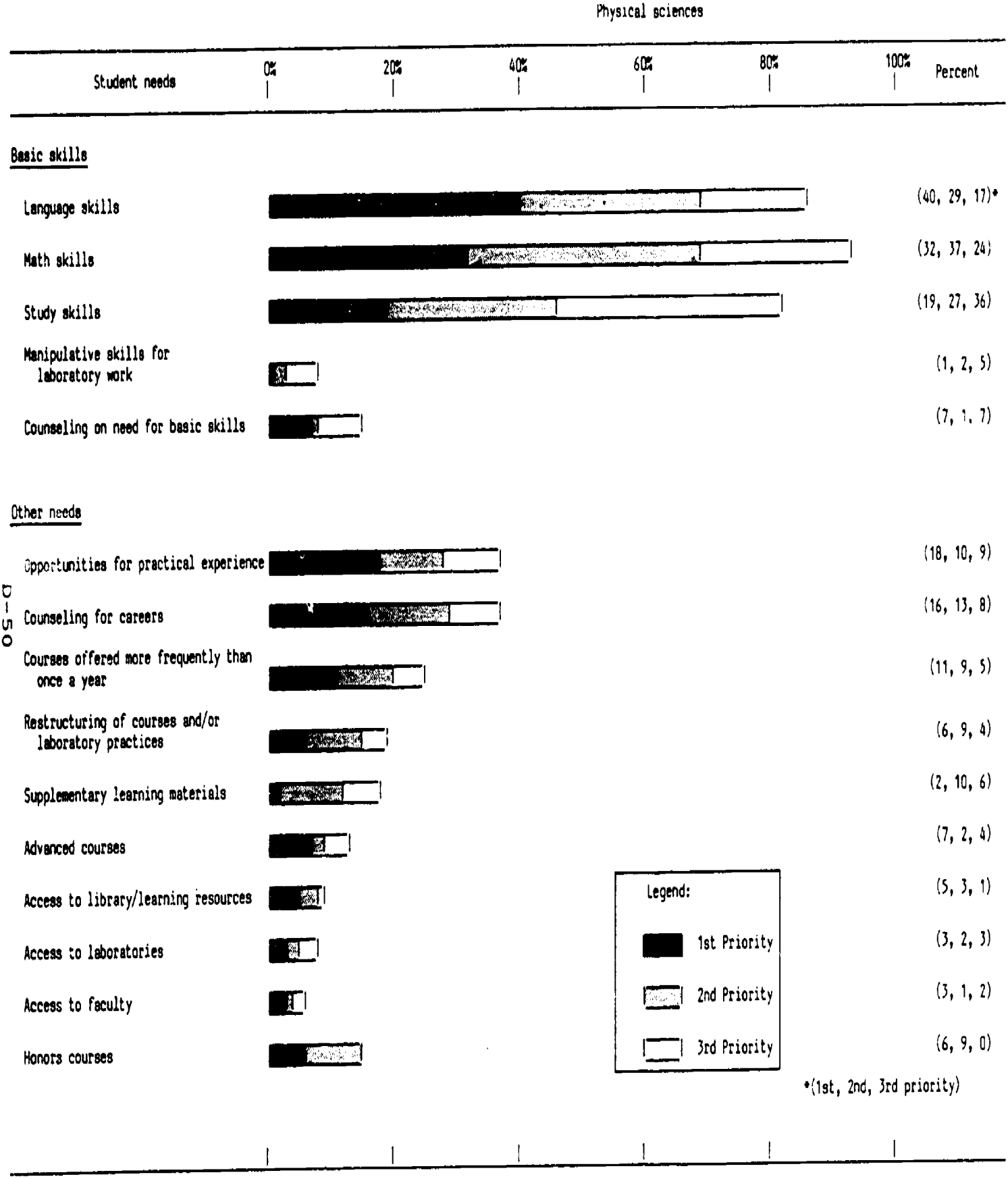


Figure FQ-24(4). Percent distribution of faculty indicating first, second, and third priority student needs, by educational field and type of need (continued)

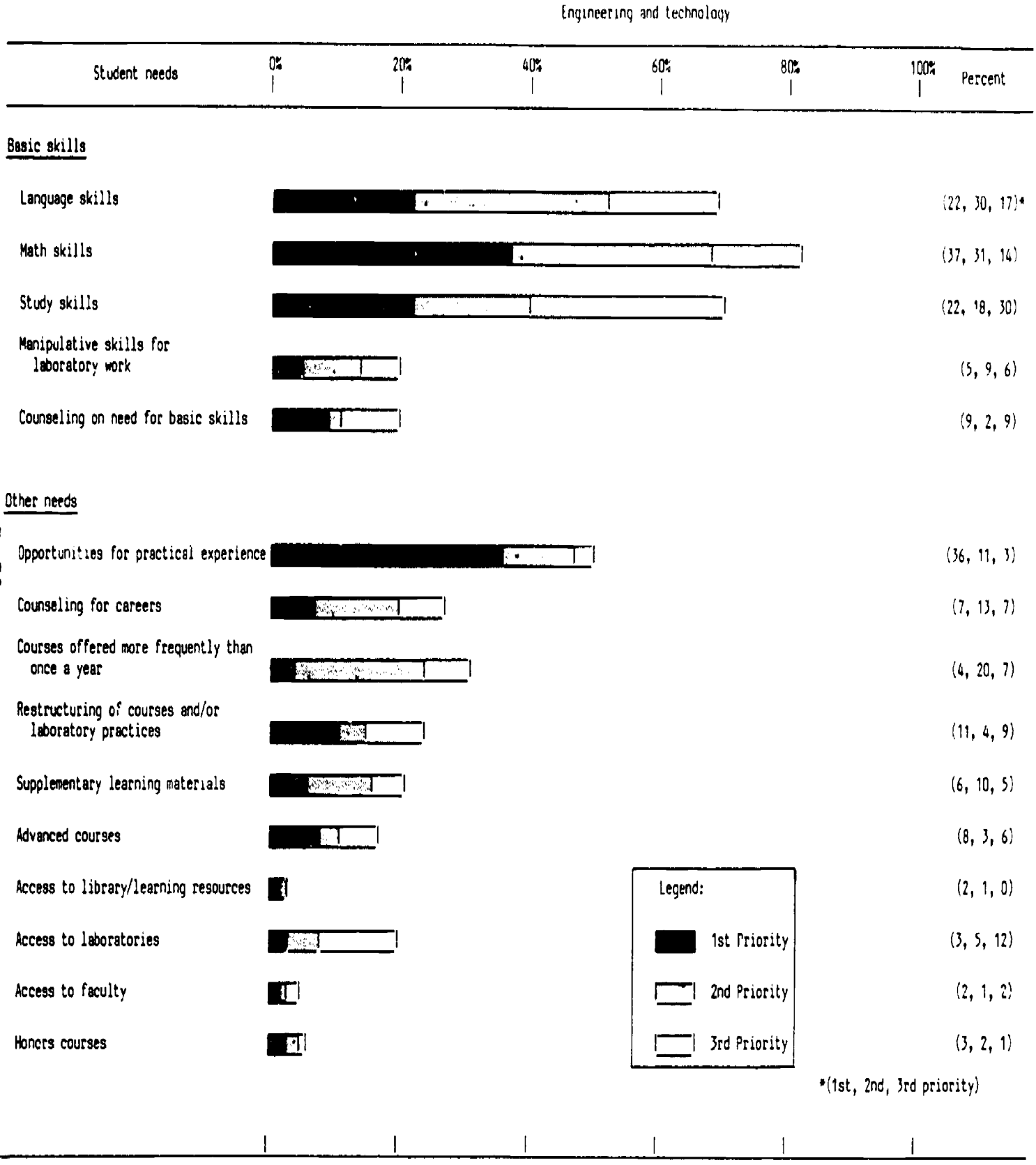


Figure FQ-24(4). Percent distribution of faculty indicating first, second, and third priority student needs, by educational field and type of need (continued)

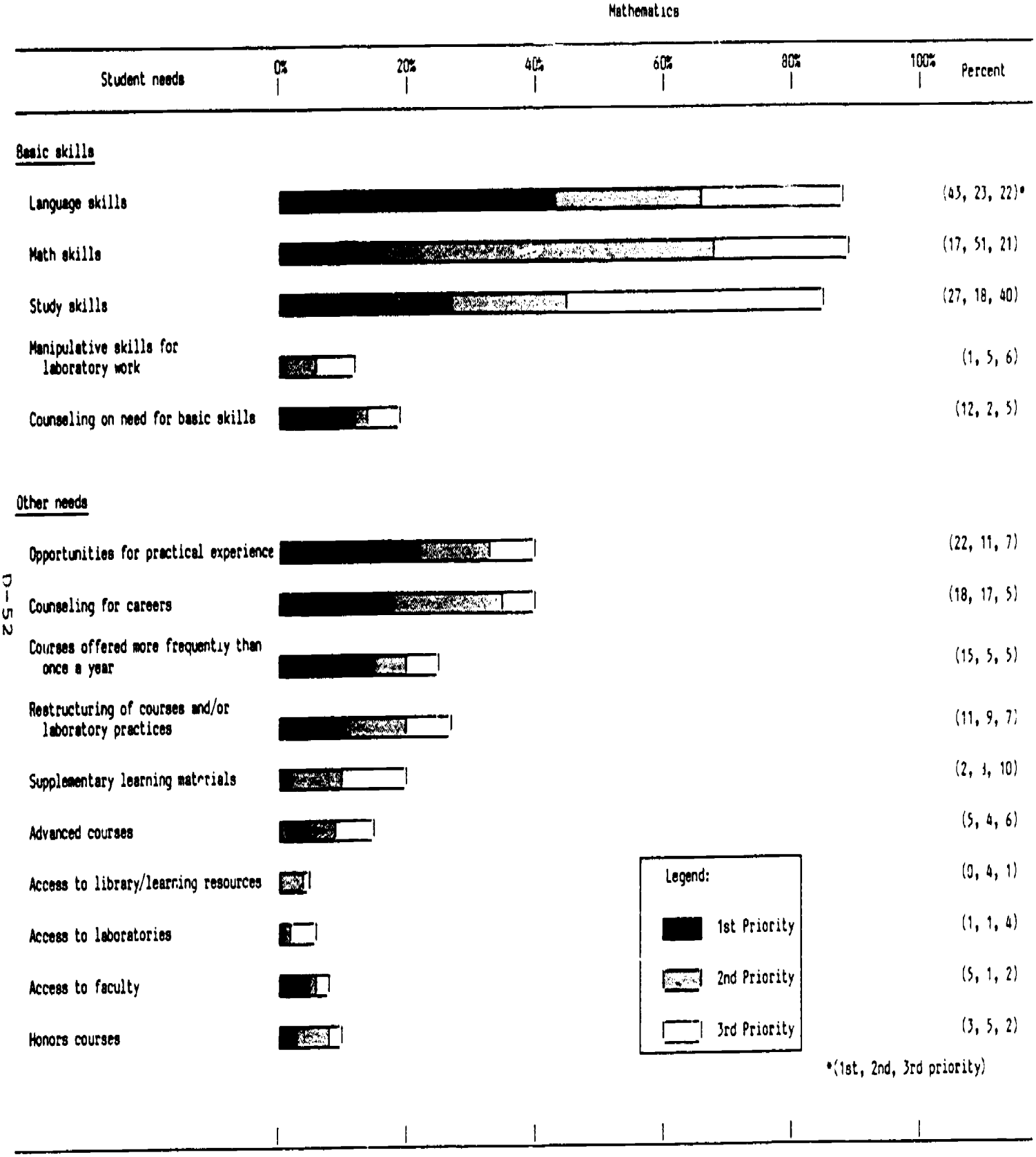


Figure FQ-24(4). Percent distribution of faculty indicating first, second, and third priority student needs, by educational field and type of need (continued)

Computer sciences

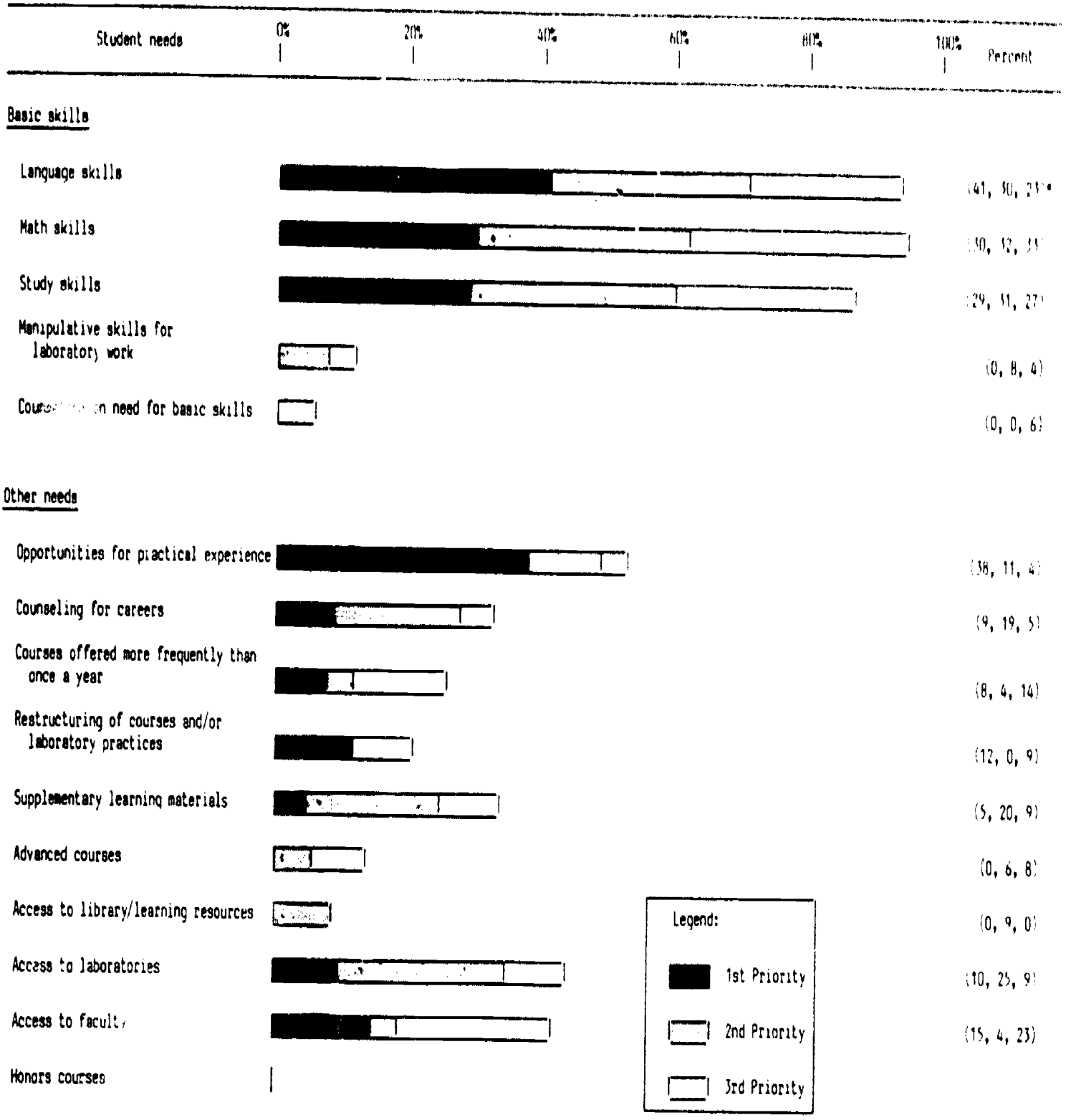


Figure FQ-24(4). Percent distribution of faculty indicating first, second, and third priority student needs, by educational field and type of need (continued)

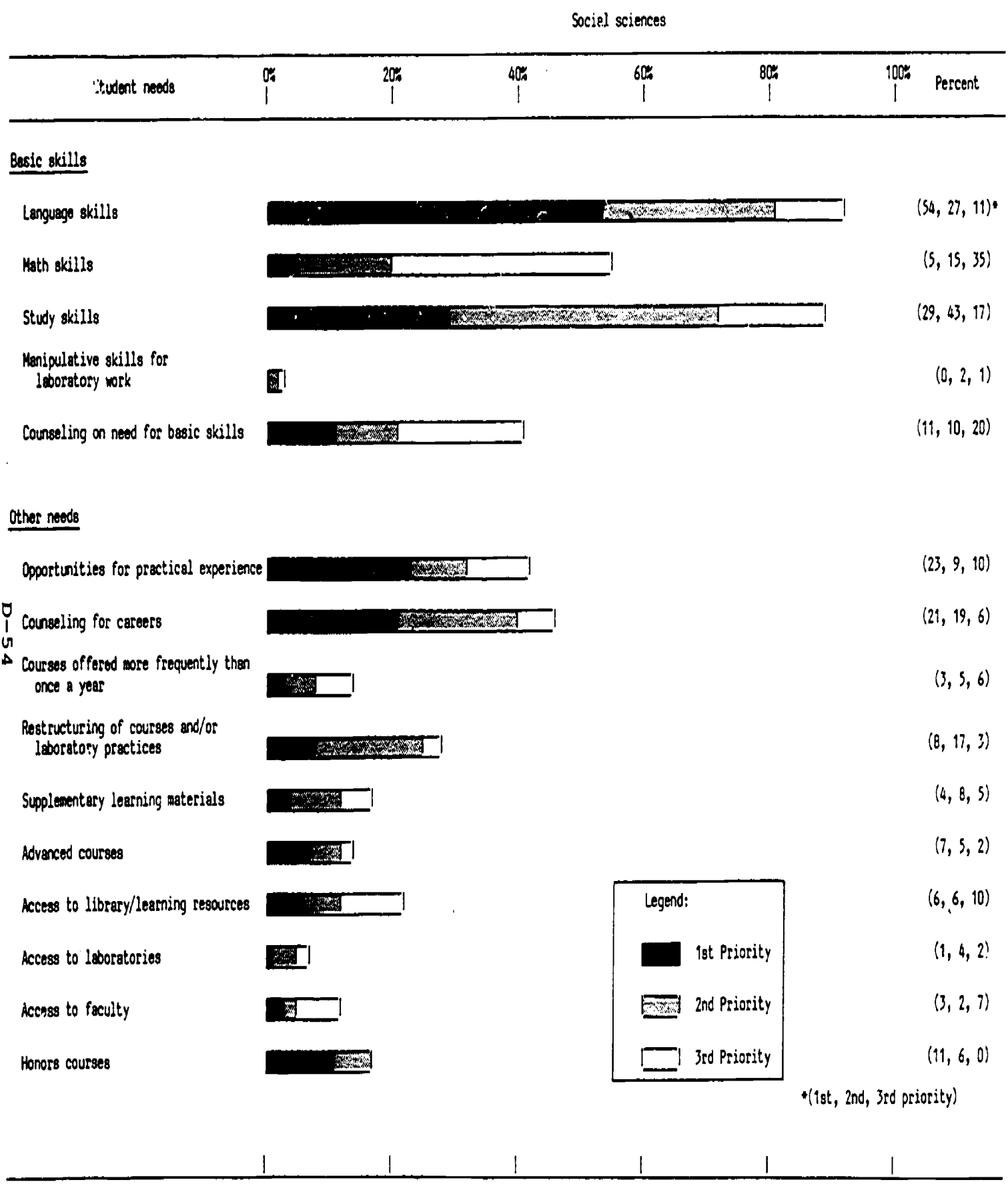


Table FQ-25(1). Percent distribution of full-time faculty reporting positive measure to encourage enrollment of women, by type of measure, type of colleg and educational field

Type of college and educational field	Women				
	Recruitment directed toward group	Special courses	Faculty sensitive to group needs	Institutional policies and procedures	Auxiliary personnel trained to assist
Type of college					
Technical institutes	59	31	68	64	24
Private colleges	60	11	57	62	6
Small comprehensive	45	24	63	34	21
Medium comprehensive	55	42	62	39	31
Large comprehensive	63	56	69	55	47
Total	60	42	65	50	33
Educational field					
Introductory biology	65	56	51	55	18
Health sciences	61	40	72	42	39
Other life sciences	44	37	60	48	33
Physical sciences	62	36	69	52	33
Engineering and technology	65	40	37	55	38
Mathematics	47	37	55	38	28
Computer sciences	62	14	67	53	28
Social sciences	66	54	68	58	36
Total	58	42	65	50	33

Table FQ-25(2). Percent distribution of full-time faculty reporting positive measures to encourage enrollment of racial/ethnic minorities, by type of measur type of college, and educational field

Type of college and educational field	Minorities				
	Recruitment directed toward group	Special courses	Faculty sensitive to group needs	Institutional policies and procedures	Auxiliary personnel trained to assist
Type of college					
Technical institutes	71	39	76	69	53
Private colleges	70	22	80	75	15
Small comprehensive	51	28	58	42	21
Medium comprehensive	57	30	58	44	36
Large comprehensive	64	54	71	58	52
Total	62	39	67	55	42
Educational field					
Introductory biology	65	40	80	56	22
Health sciences	65	38	68	43	56
Other life sciences	53	32	60	54	42
Physical sciences	64	37	75	61	42
Engineering and technology	67	34	68	58	33
Mathematics	51	35	60	42	33
Computer sciences	71	28	72	77	46
Social sciences	69	54	68	64	40
Total	62	39	67	55	42

Table FQ-25(3). Percent distribution of full-time faculty reporting positive measures to encourage enrollment of handicapped students, by type of measure, type of college, and educational field

Type of college and educational field	Handicapped				
	Recruitment directed toward group	Special courses	Faculty sensitive to group needs	Institutional policies and procedures	Auxiliary personnel trained to assist
Type of college					
Technical institutes	47	26	53	64	43
Private colleges	33	0	54	39	11
Small comprehensive	32	14	57	34	16
Medium comprehensive	41	23	57	45	30
Large comprehensive	58	38	74	67	59
Total	46	27	62	54	40
Educational field					
Introductory biology	51	23	65	55	32
Health sciences	41	35	60	52	46
Other life sciences	45	21	58	52	43
Physical sciences	40	21	65	52	39
Engineering and technology	52	32	62	52	38
Mathematics	29	17	62	46	28
Computer sciences	44	28	75	69	52
Social sciences	61	31	66	64	41
Total	46	27	62	54	40

Figure FQ-27. Faculty members' estimates of the degree of their responsibility for planning individual courses: average ratings, by area of responsibility, educational field, and type of college

Designing course outline, goals

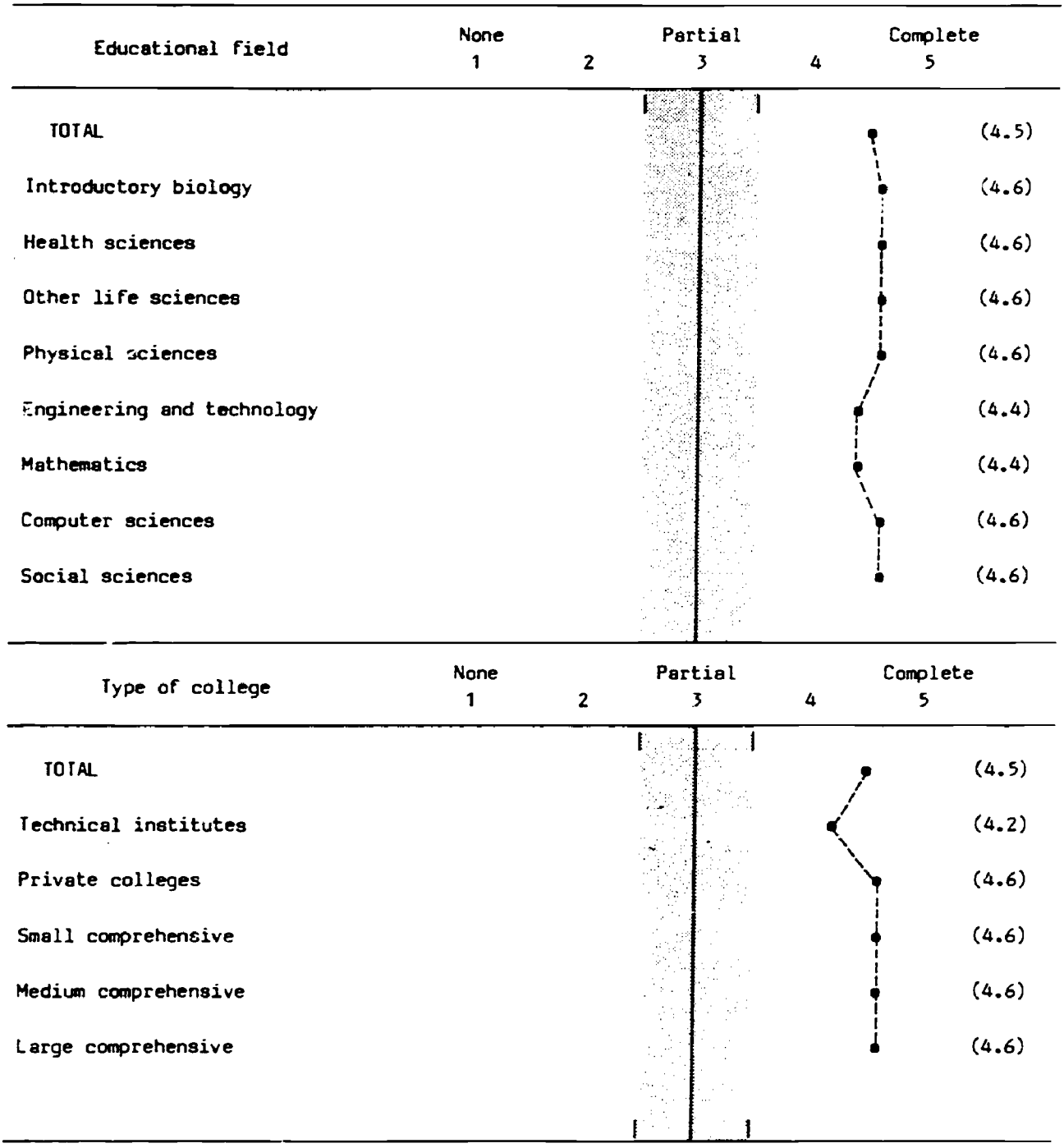


Figure FQ-27. Faculty members' estimates of the degree of their responsibility for planning individual courses: average ratings, by area of responsibility, educational field, and type of college (continued)

Developing syllabus

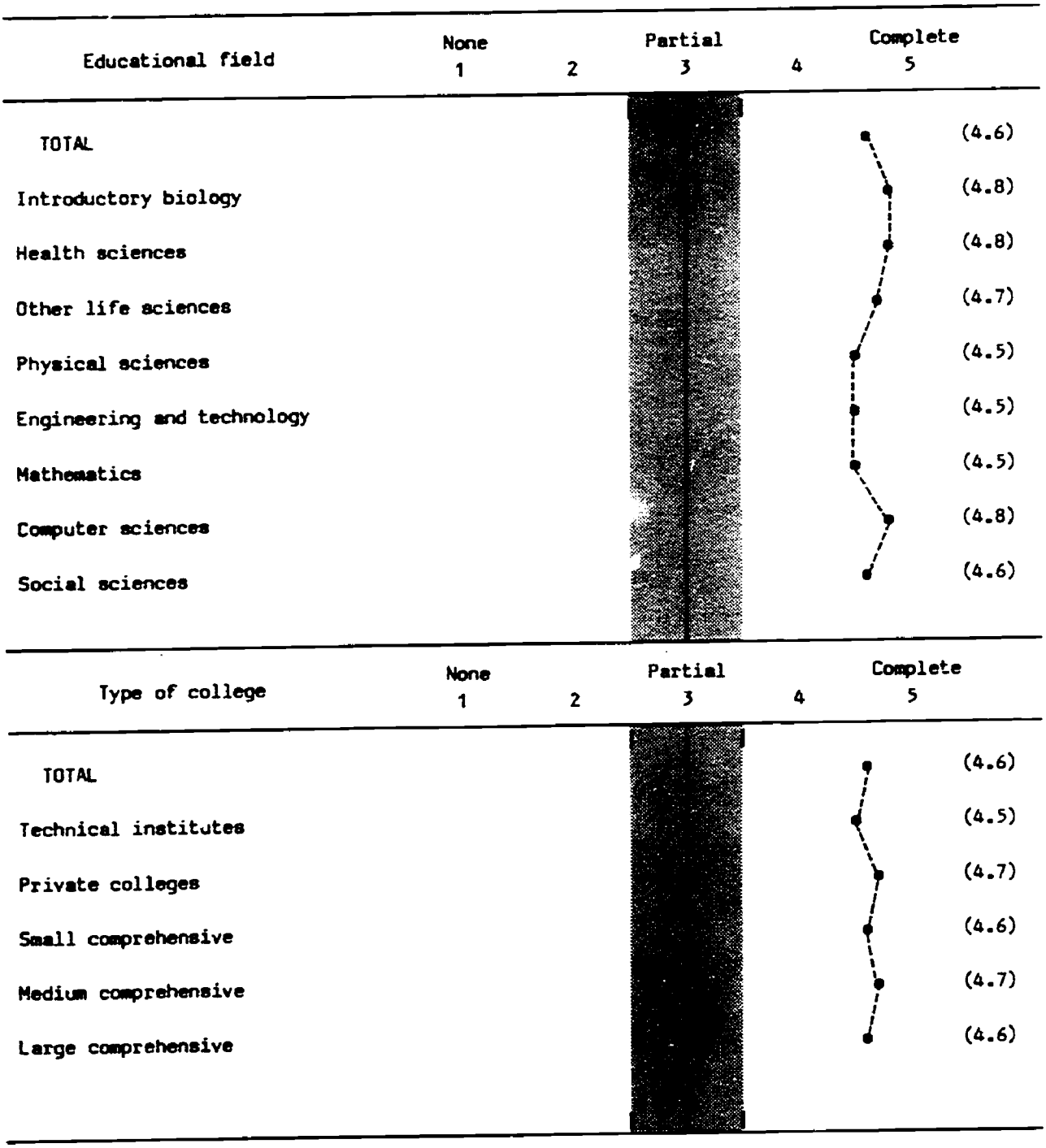


Figure FQ-27. Faculty members' estimates of the degree of their responsibility for planning individual courses: average ratings, by area of responsibility, educational field, and type of college (continued)

Selecting text, or selecting to have no text

Educational field	None 1	2	Partial 3	4	Complete 5	
TOTAL						(4.6)
Introductory biology						(4.8)
Health sciences						(4.7)
Other life sciences						(4.7)
Physical sciences						(4.5)
Engineering and technology						(4.4)
Mathematics						(4.3)
Computer sciences						(4.5)
Social sciences						(4.7)

Type of college	None 1	2	Partial 3	4	Complete 5	
TOTAL						(4.6)
Technical institutes						(4.5)
Private colleges						(4.7)
Small comprehensive						(4.6)
Medium comprehensive						(4.7)
Large comprehensive						(4.6)

Figure FQ-27. Faculty members' estimates of the degree of their responsibility for planning individual courses: average ratings, by area of responsibility, educational field, and type of college (continued)

Designing or choosing laboratory exercises

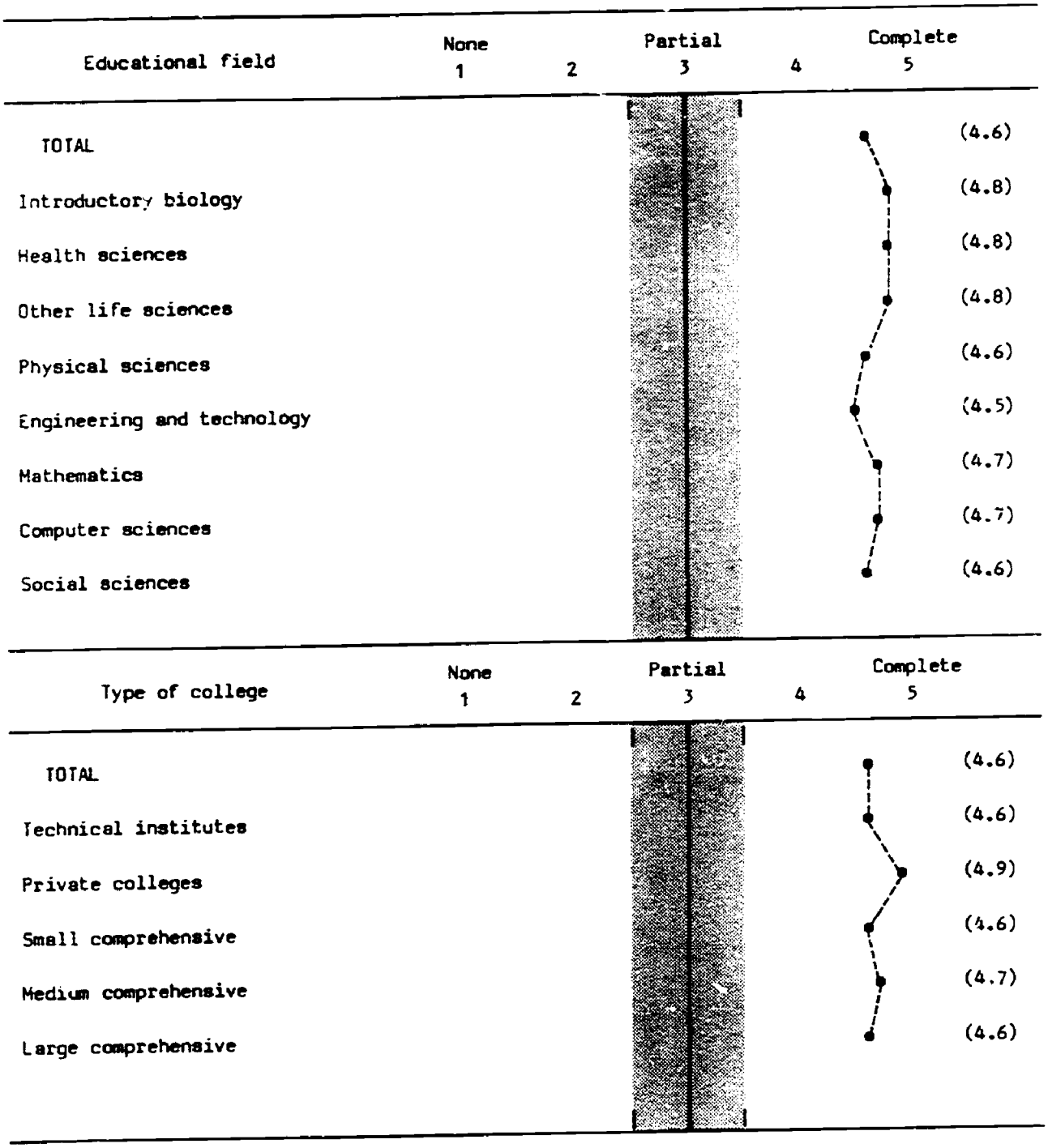


Figure FQ-27. Faculty members' estimates of the degree of their responsibility for planning individual courses: average ratings, by area of responsibility, educational field, and type of college (continued)

Choosing own teaching methods

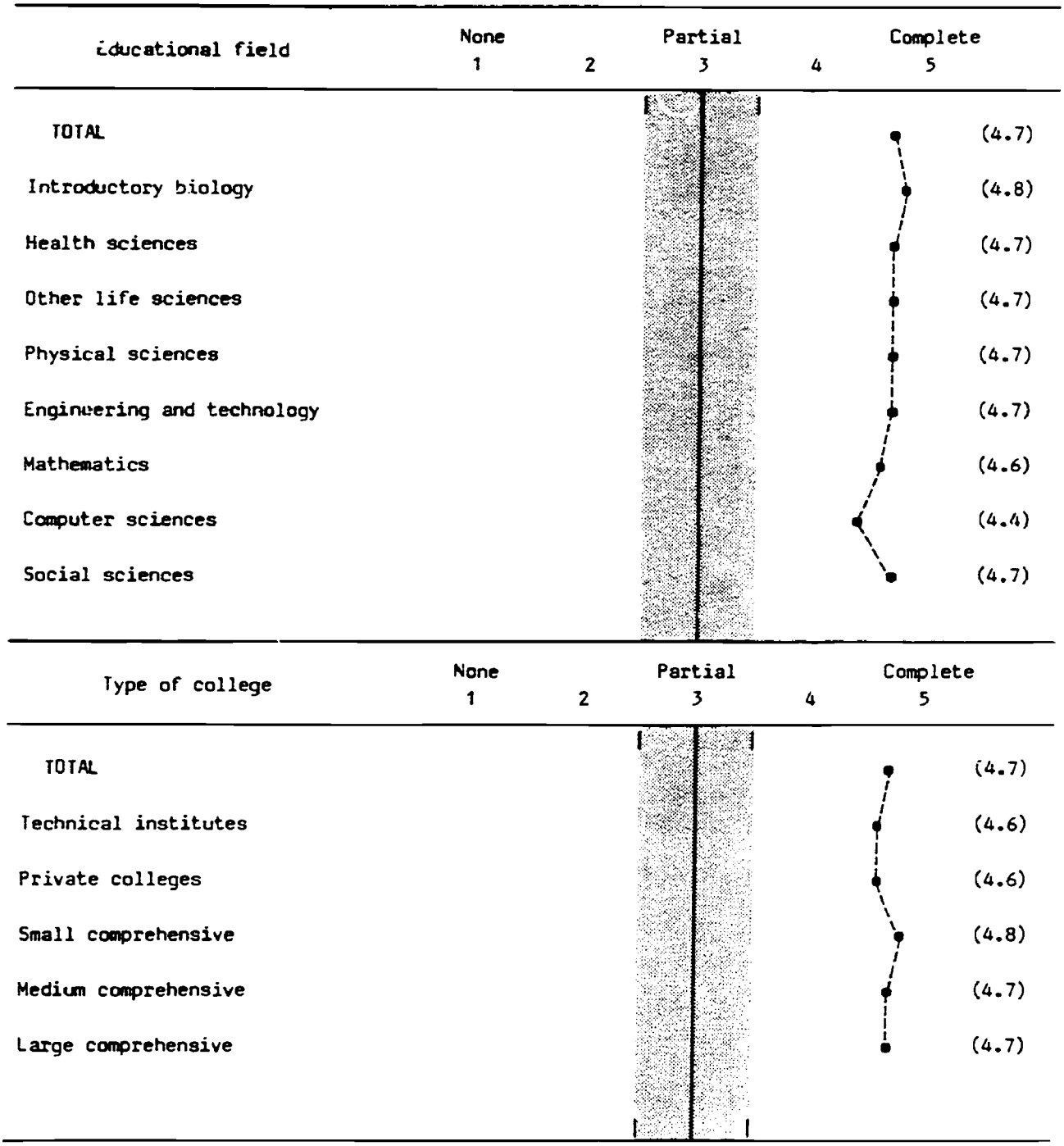


Figure FQ-27. Faculty members' estimates of the degree of their responsibility for planning individual courses: average ratings, by area of responsibility, educational field, and type of college (continued)

Selecting science equipment for demonstrations and lab

Educational field	None 1	2	Partial 3	4	Complete 5	
TOTAL						(4.3)
Introductory biology						(4.5)
Health sciences						(4.2)
Other life sciences						(4.5)
Physical sciences						(4.4)
Engineering and technology						(4.2)
Mathematics						(4.3)
Computer sciences						(4.1)
Social sciences						(4.2)

Type of college	None 1	2	Partial 3	4	Complete 5	
TOTAL						(4.3)
Technical institutes						(4.4)
Private colleges						(4.3)
Small comprehensive						(4.6)
Medium comprehensive						(4.3)
Large comprehensive						(4.2)

Figure FQ-27. Faculty members' estimates of the degree of their responsibility for planning individual courses: average ratings, by area of responsibility, educational field, and type of college (continued)

Developing budgets

Educational field	None 1	2	Partial 3	4	Complete 5	
TOTAL						(2.5)
Introductory biology						(2.7)
Health sciences						(2.2)
Other life sciences						(2.7)
Physical sciences						(2.5)
Engineering and technology						(2.8)
Mathematics						(2.5)
Computer sciences						(2.4)
Social sciences						(2.4)

Type of college	None 1	2	Partial 3	4	Complete 5	
TOTAL						(2.5)
Technical institutes						(2.4)
Private colleges						(2.9)
Small comprehensive						(2.7)
Medium comprehensive						(2.6)
Large comprehensive						(2.3)

Figure FQ-29. Faculty members' estimates of the degree of their responsibility for planning curricular programs: average ratings, by area of responsibility, educational field, and type of college

Determining need for program

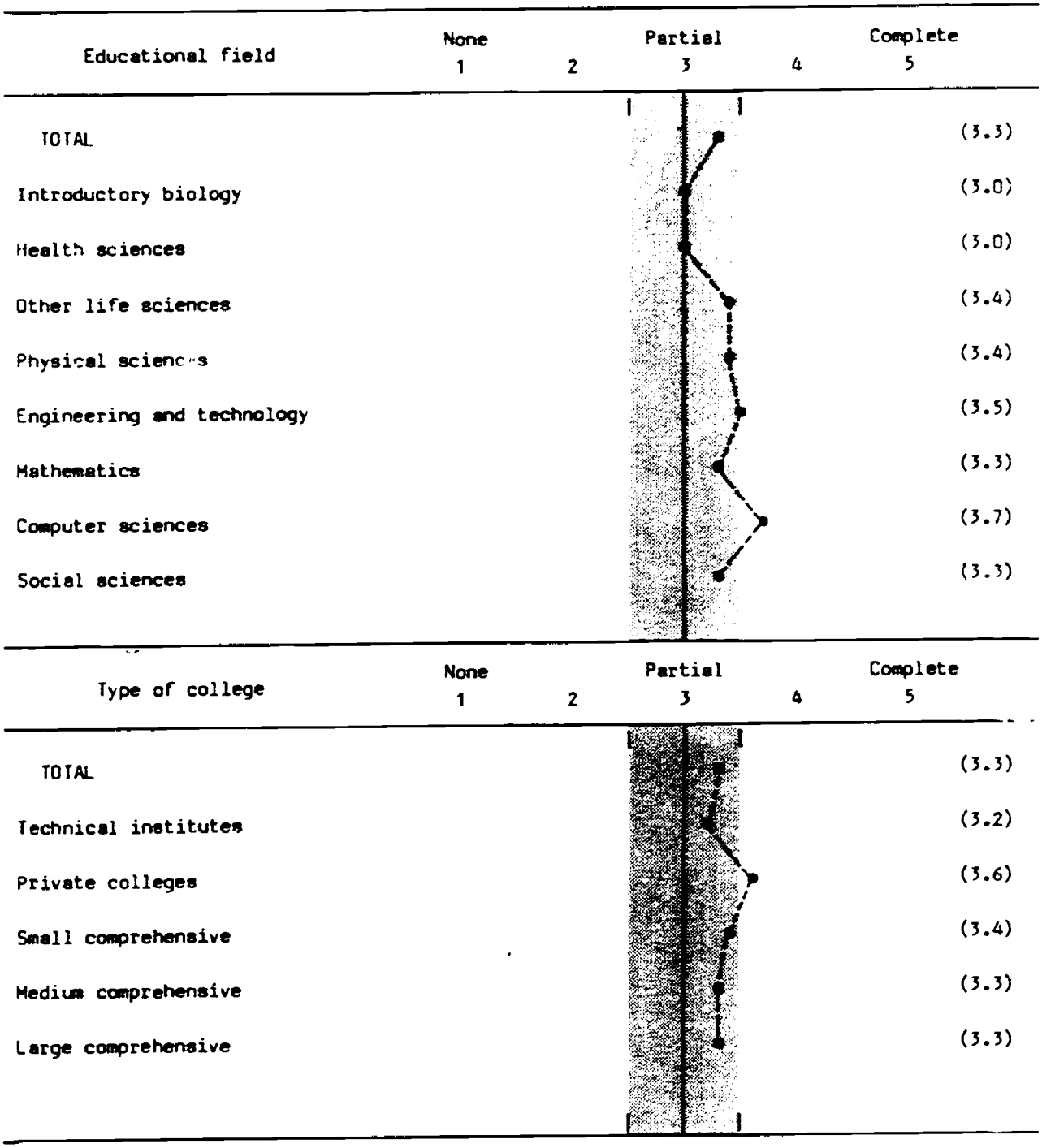


Figure FQ-29. Faculty members' estimates of the degree of their responsibility for planning curricular programs: average ratings, by area of responsibility, educational field, and type of college (continued)

Preparing cost estimates

Educational field	None 1	2	Partial 3	4	Complete 5	
TOTAL						(2.6)
Introductory biology						(2.5)
Health sciences						(2.2)
Other life sciences						(2.8)
Physical sciences						(2.9)
Engineering and technology						(3.1)
Mathematics						(2.5)
Computer sciences						(3.2)
Social sciences						(2.5)

Type of college	None 1	2	Partial 3	4	Complete 5	
TOTAL						(2.6)
Technical institutes						(2.7)
Private colleges						(3.0)
Small comprehensive						(2.7)
Medium comprehensive						(2.6)
Large comprehensive						(2.6)

Figure FQ-29. Faculty members' estimates of the degree of their responsibility for planning curricular programs: average ratings, by area of responsibility, educational field, and type of college (continued)

Outlining goals, defining student skills and educational outcomes

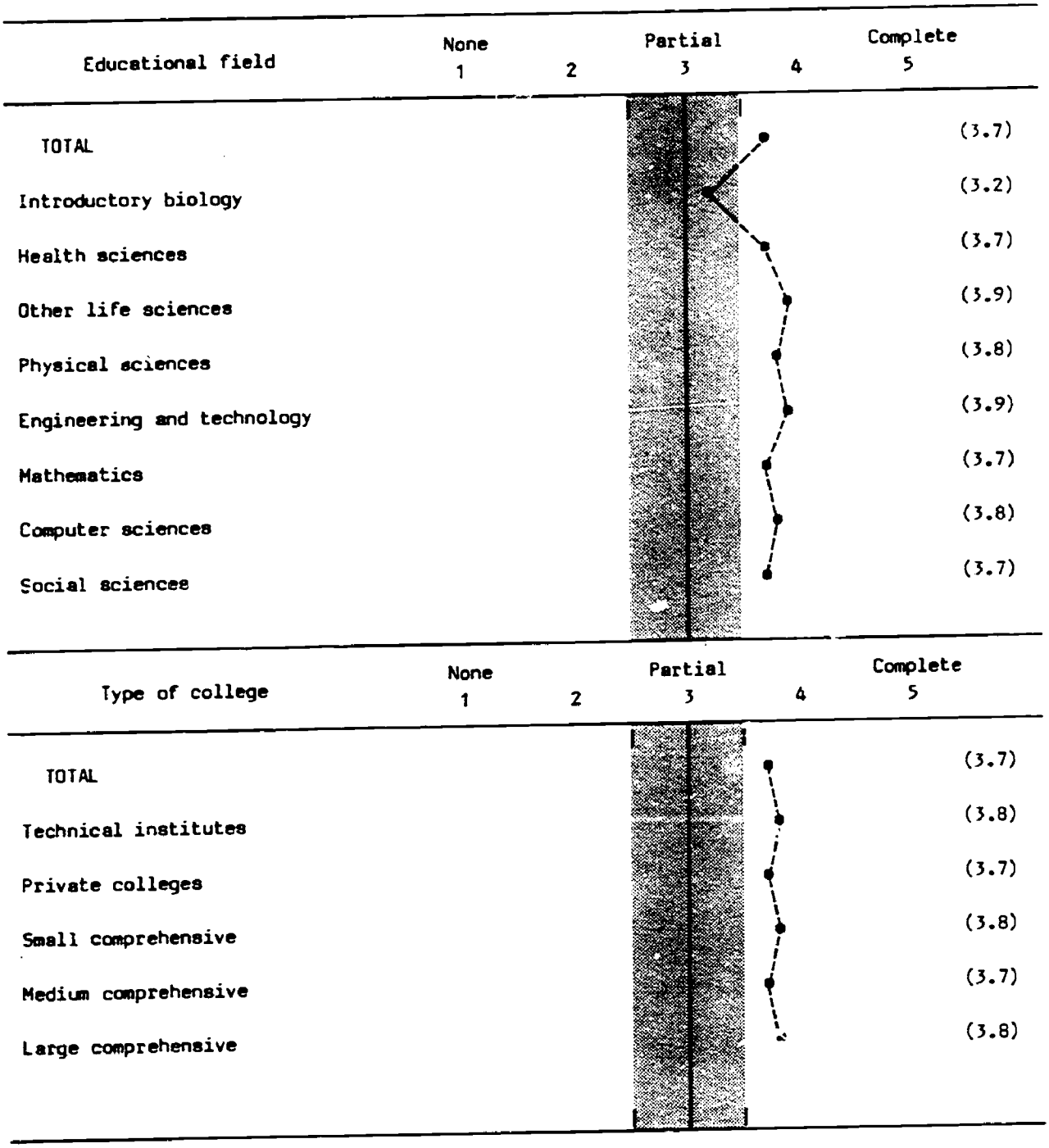


Figure FQ-29. Faculty members' estimates of the degree of their responsibility for planning curricular programs: average ratings, by area of responsibility, educational field, and type of college (continued)

Outlining program structure

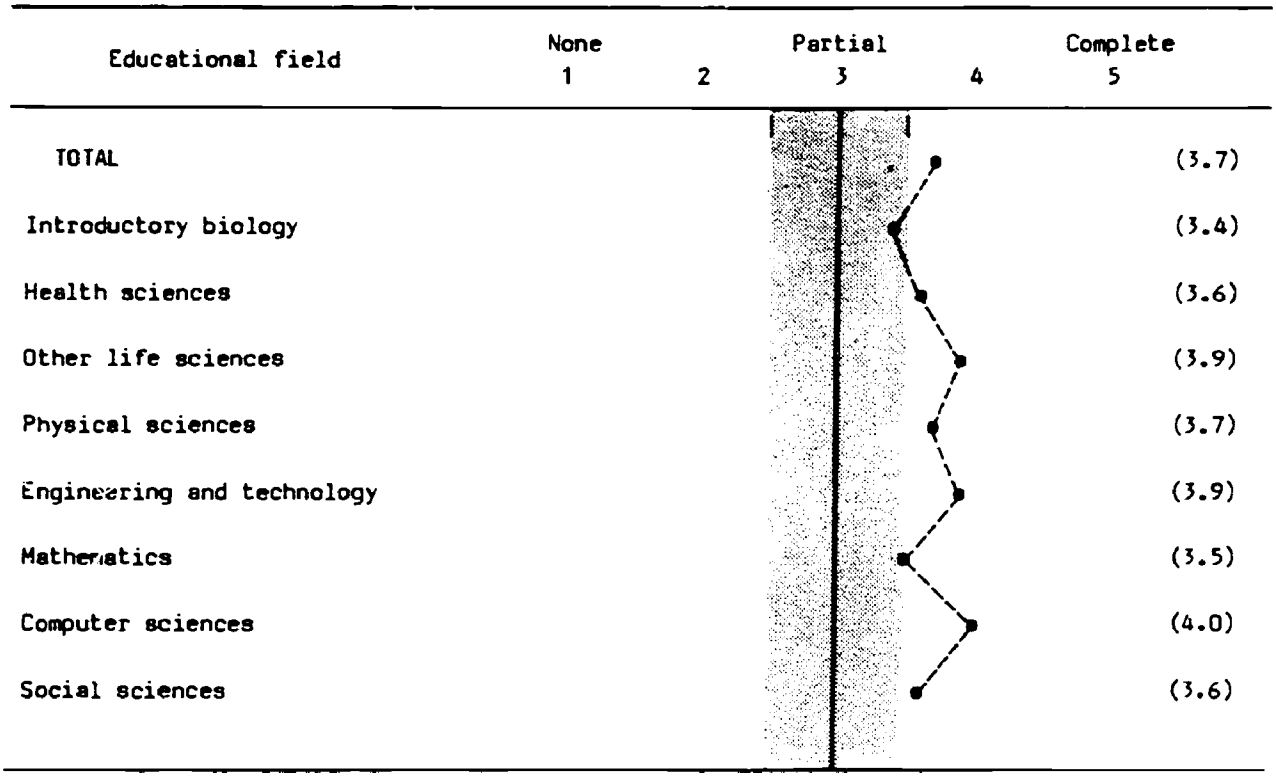


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college

1. Course structure

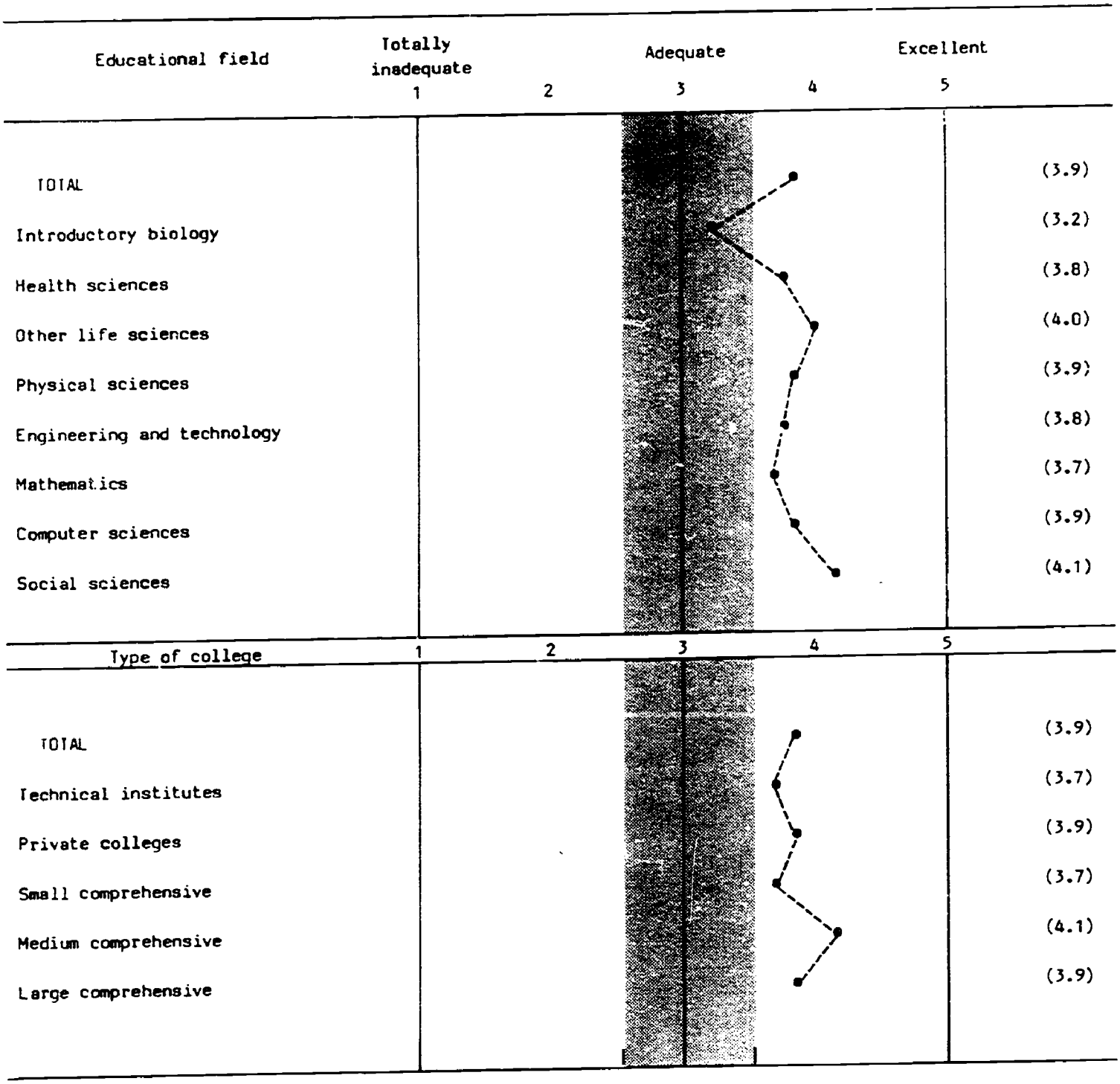


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

2. Classroom/lecture facilities

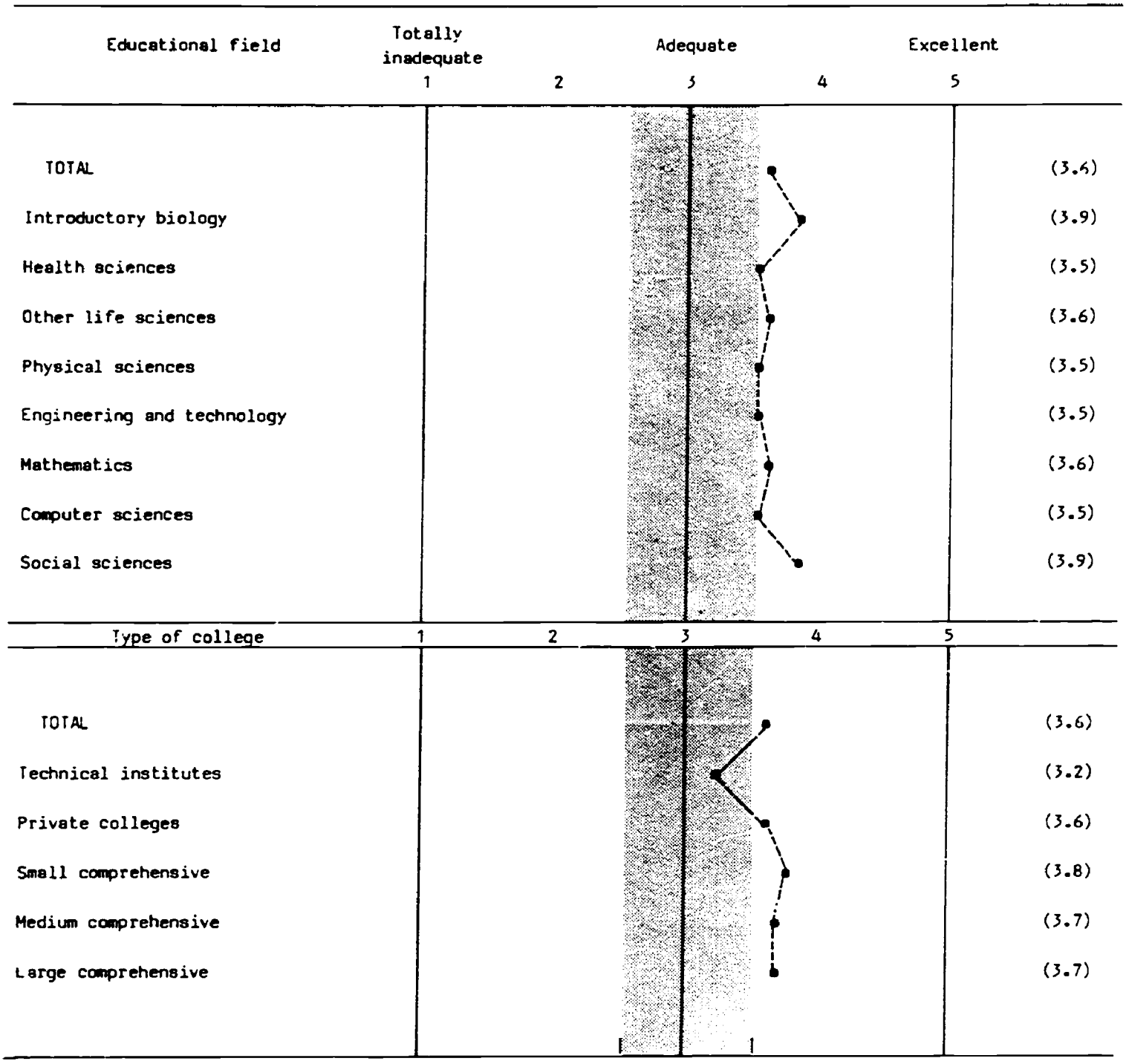


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

3. Class preparation areas

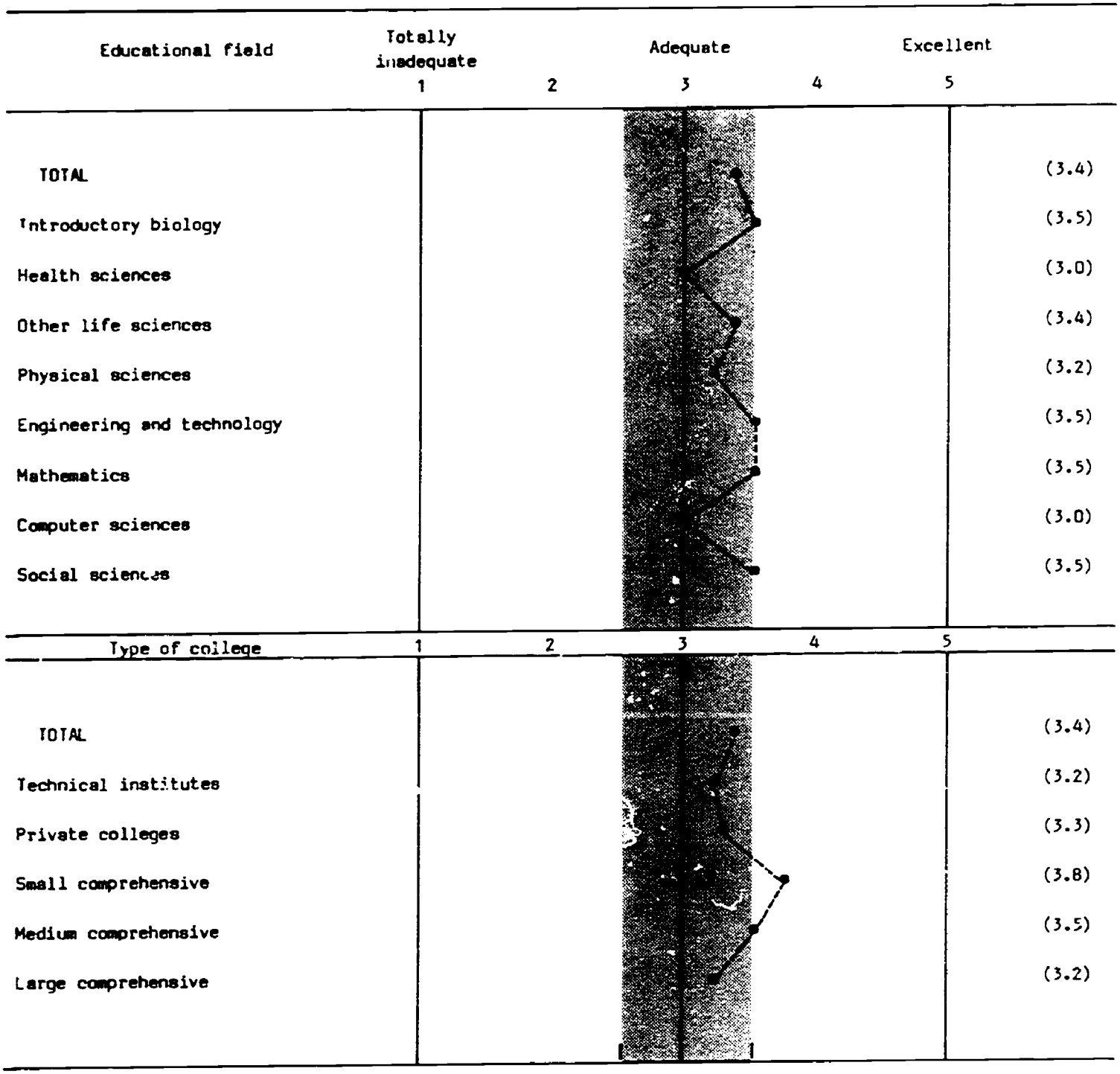


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

4. Lecture-demonstration facilities

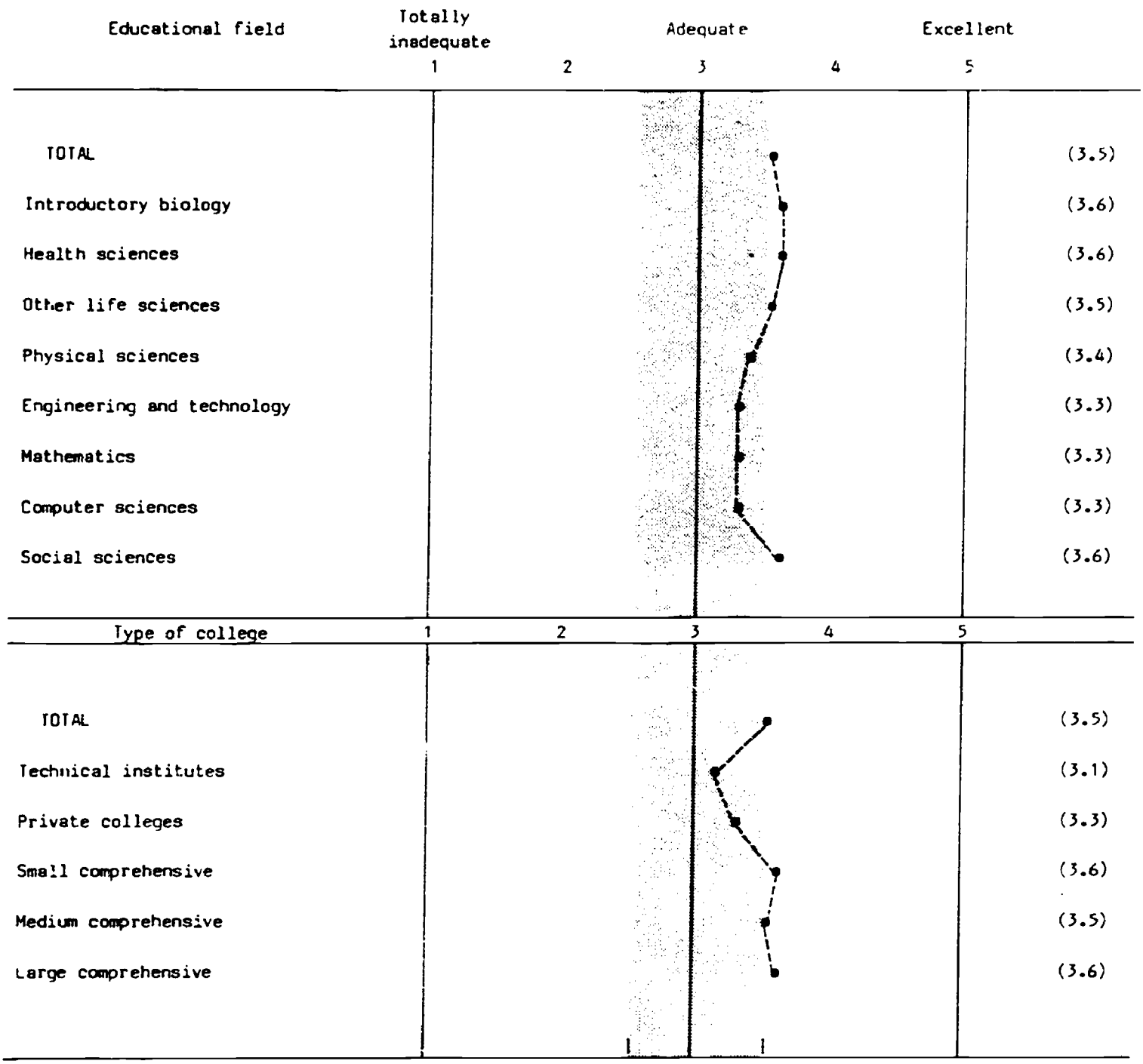


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

5. Laboratory facilities (space)

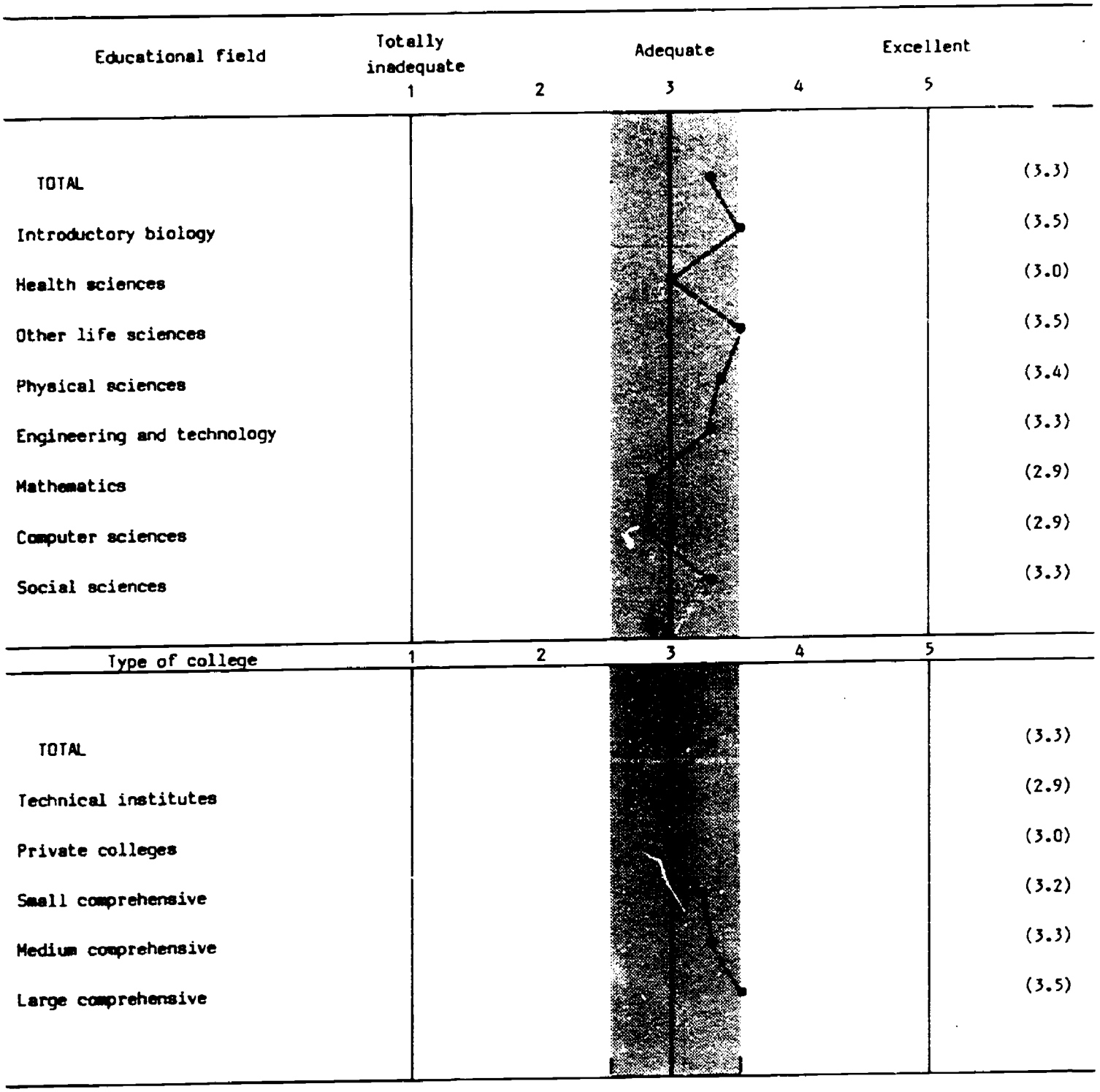


Figure FQ-3. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

6. Laboratory apparatus and equipment

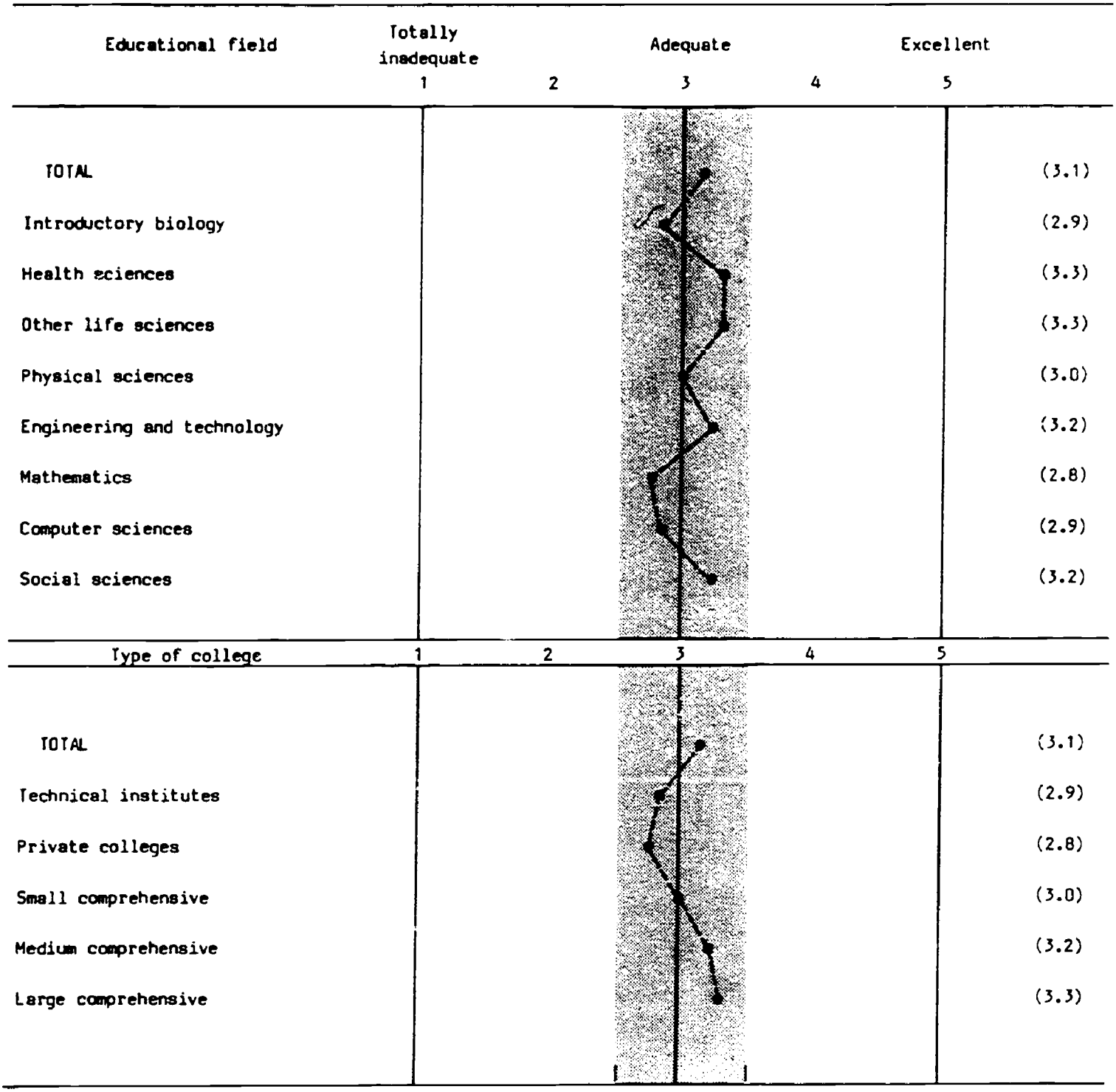


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

7. Budget for laboratory equipment and supplies

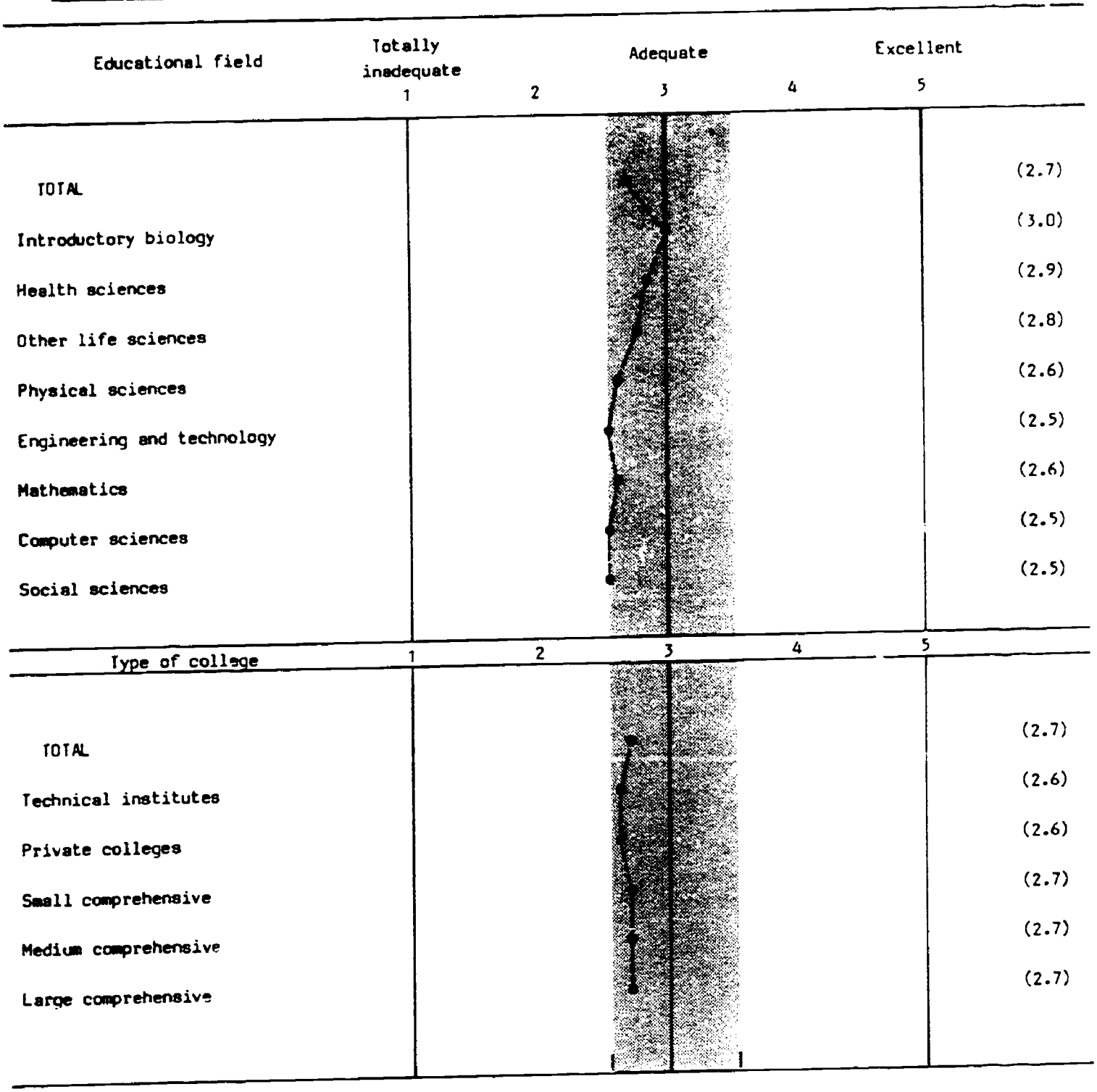


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

8. Laboratory usage

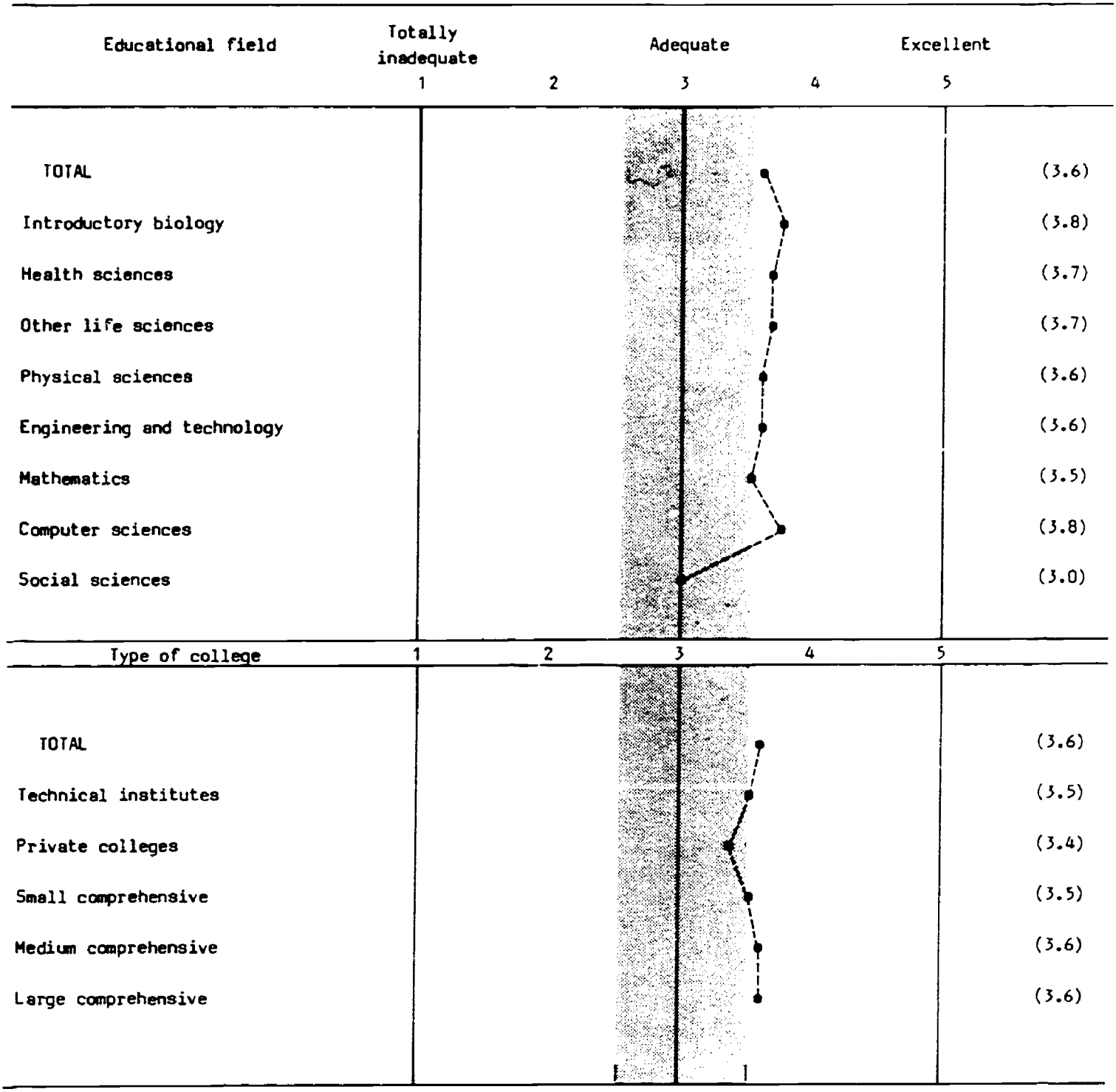


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

9. Instructional technicians (laboratory aides) - quantity

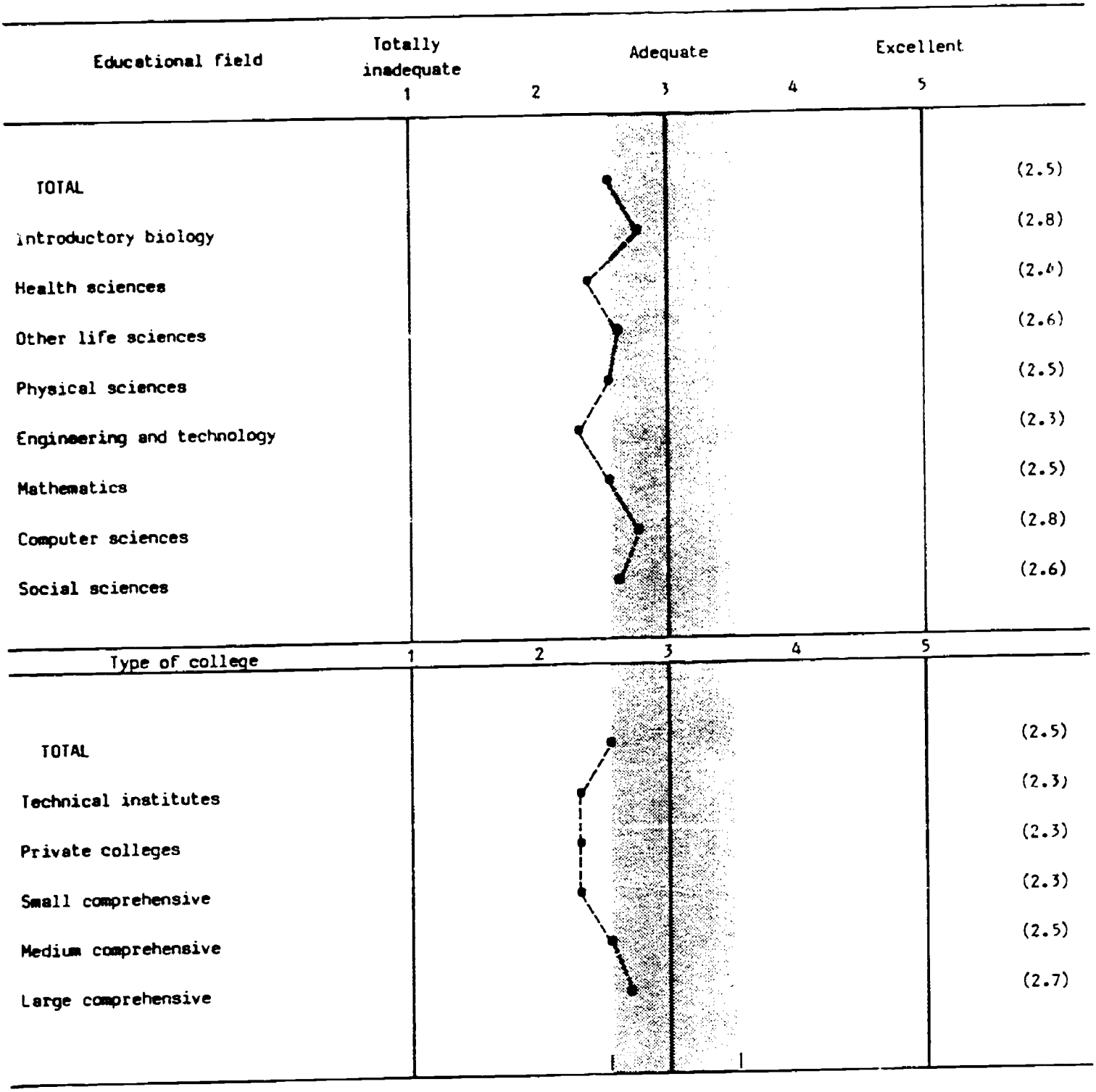


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

10. Instructional technicians (laboratory aides) - quality

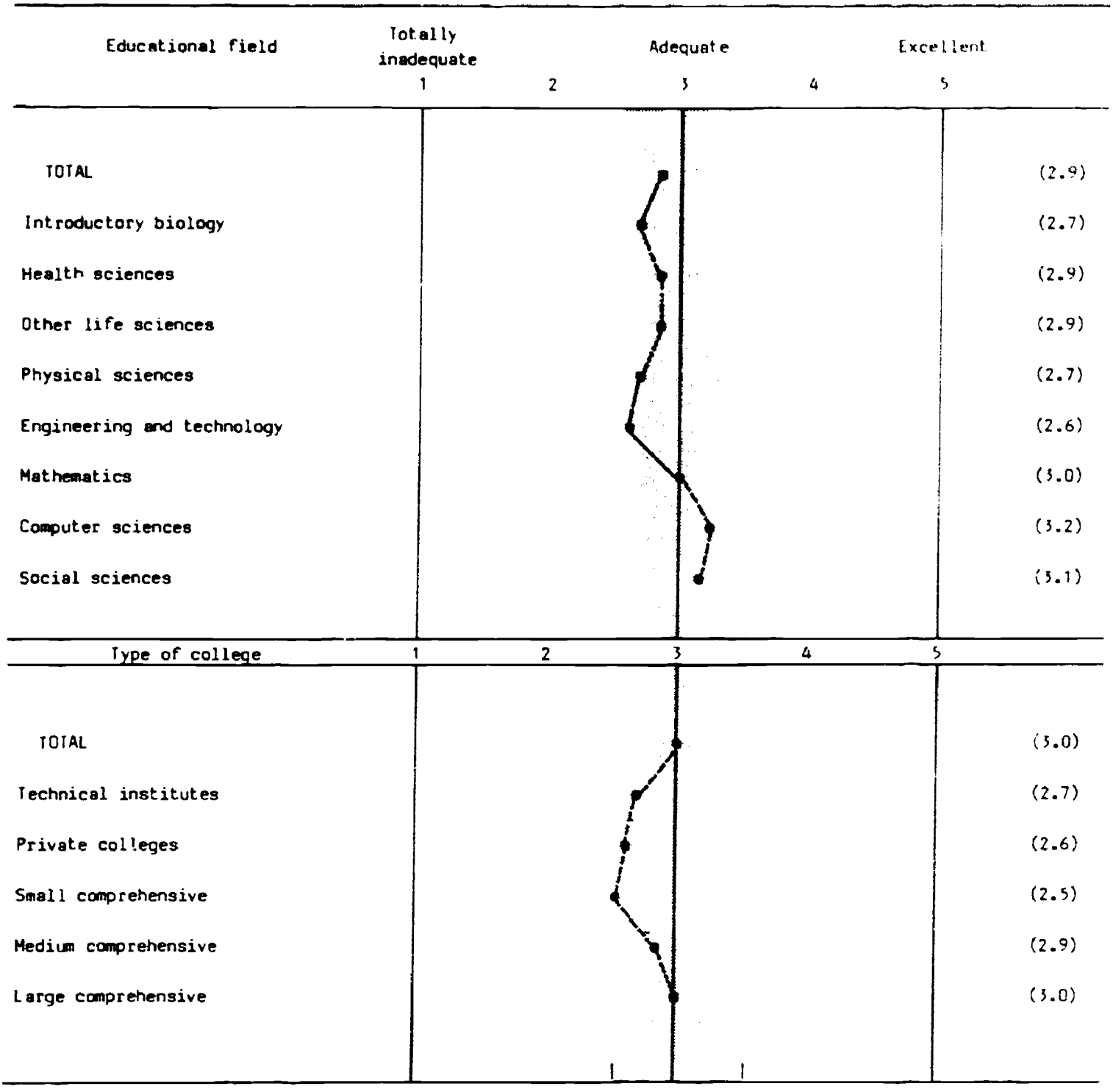


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

11. Availability of teaching aids

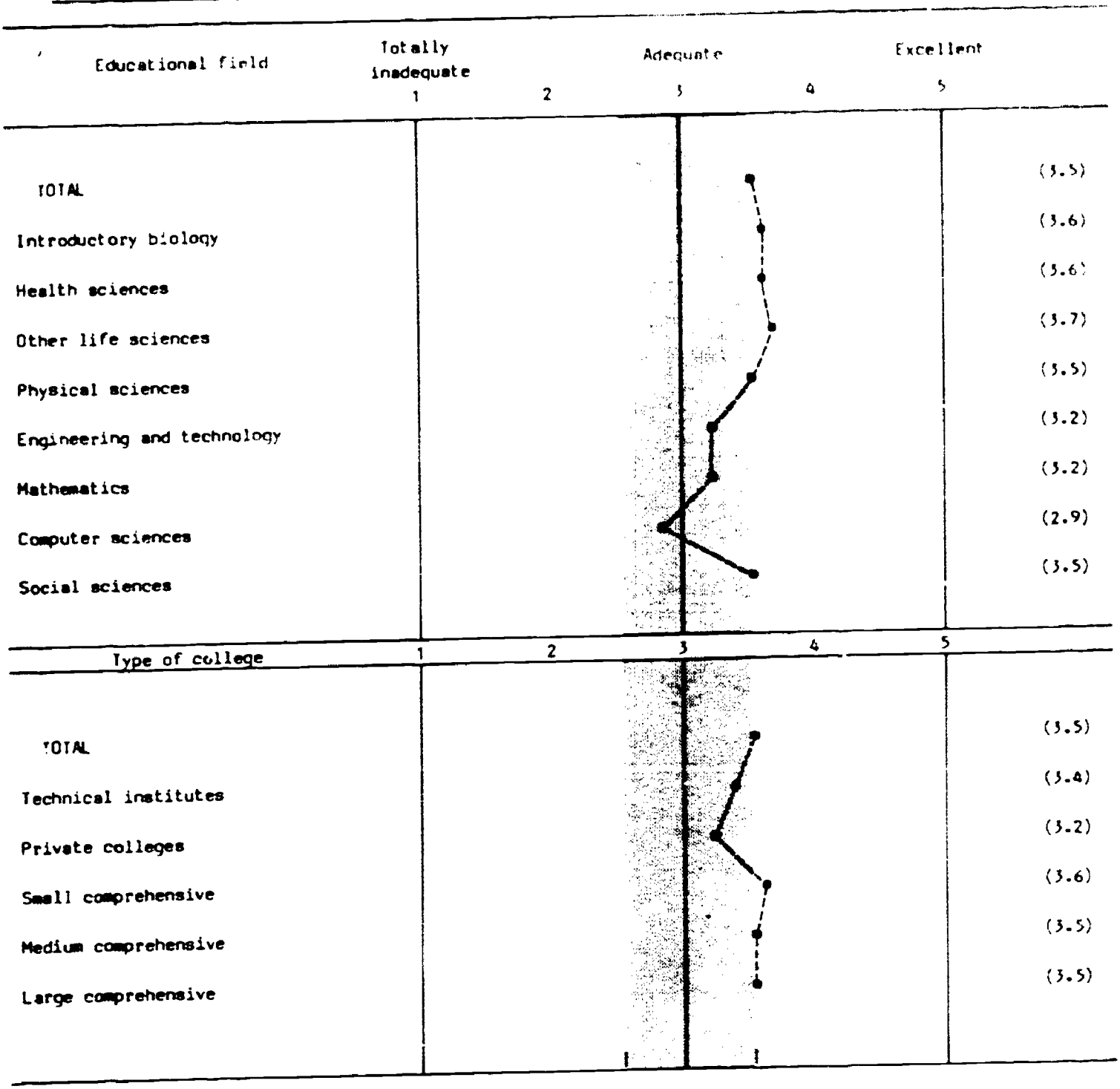


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

12. Size of classes

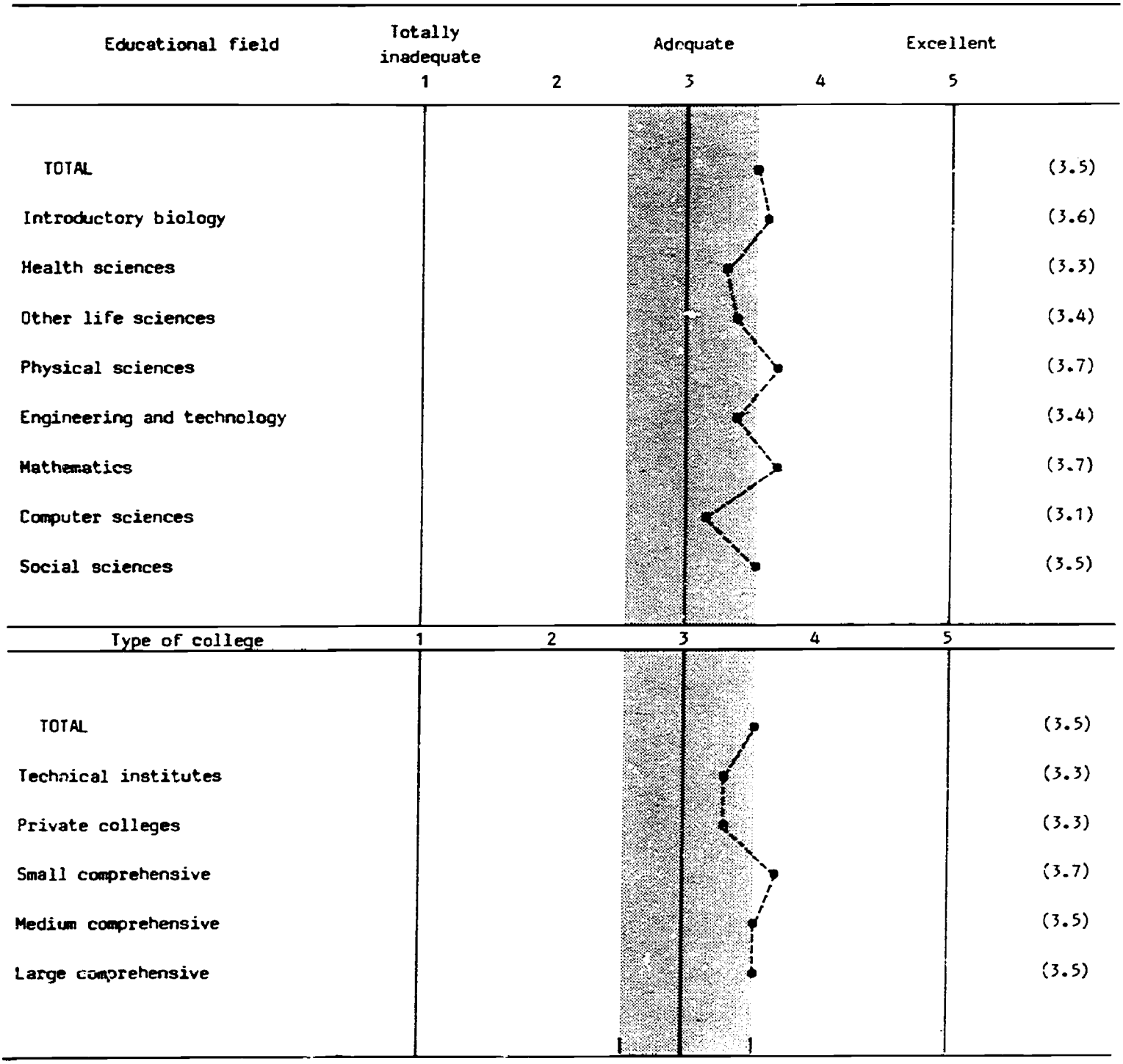


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

13. Prior preparation of students

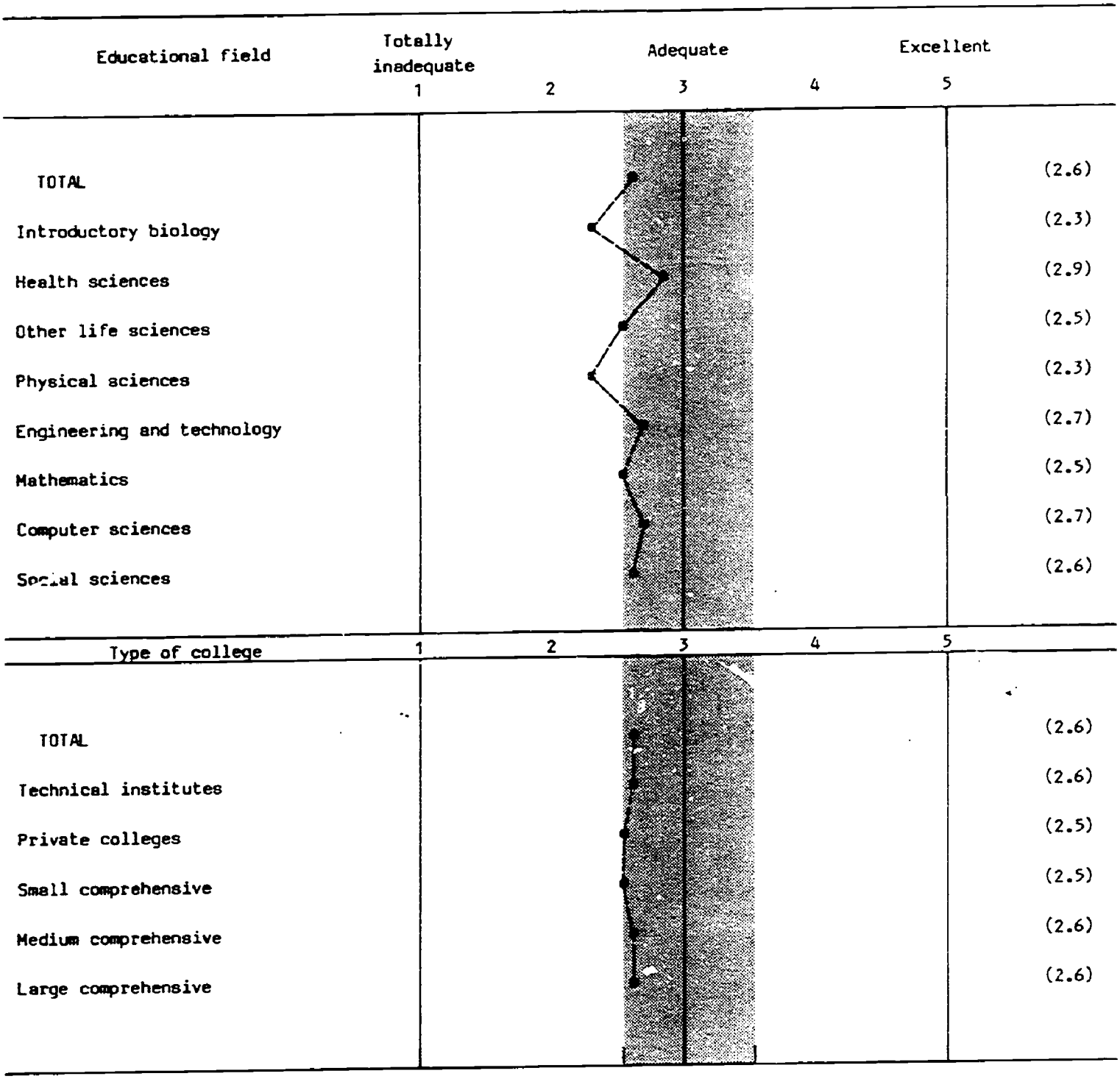


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

14. Clerical support

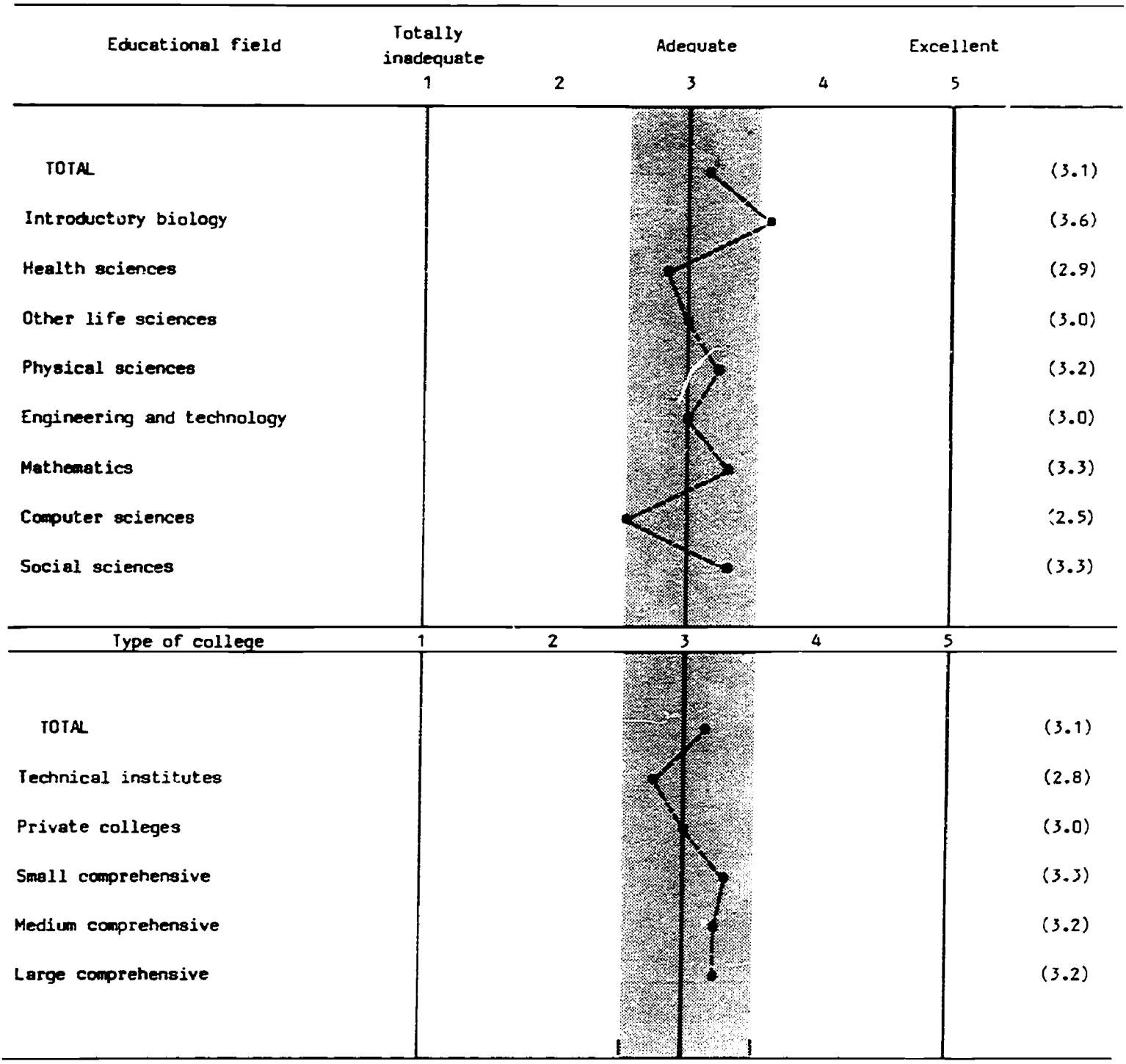


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

15. Library

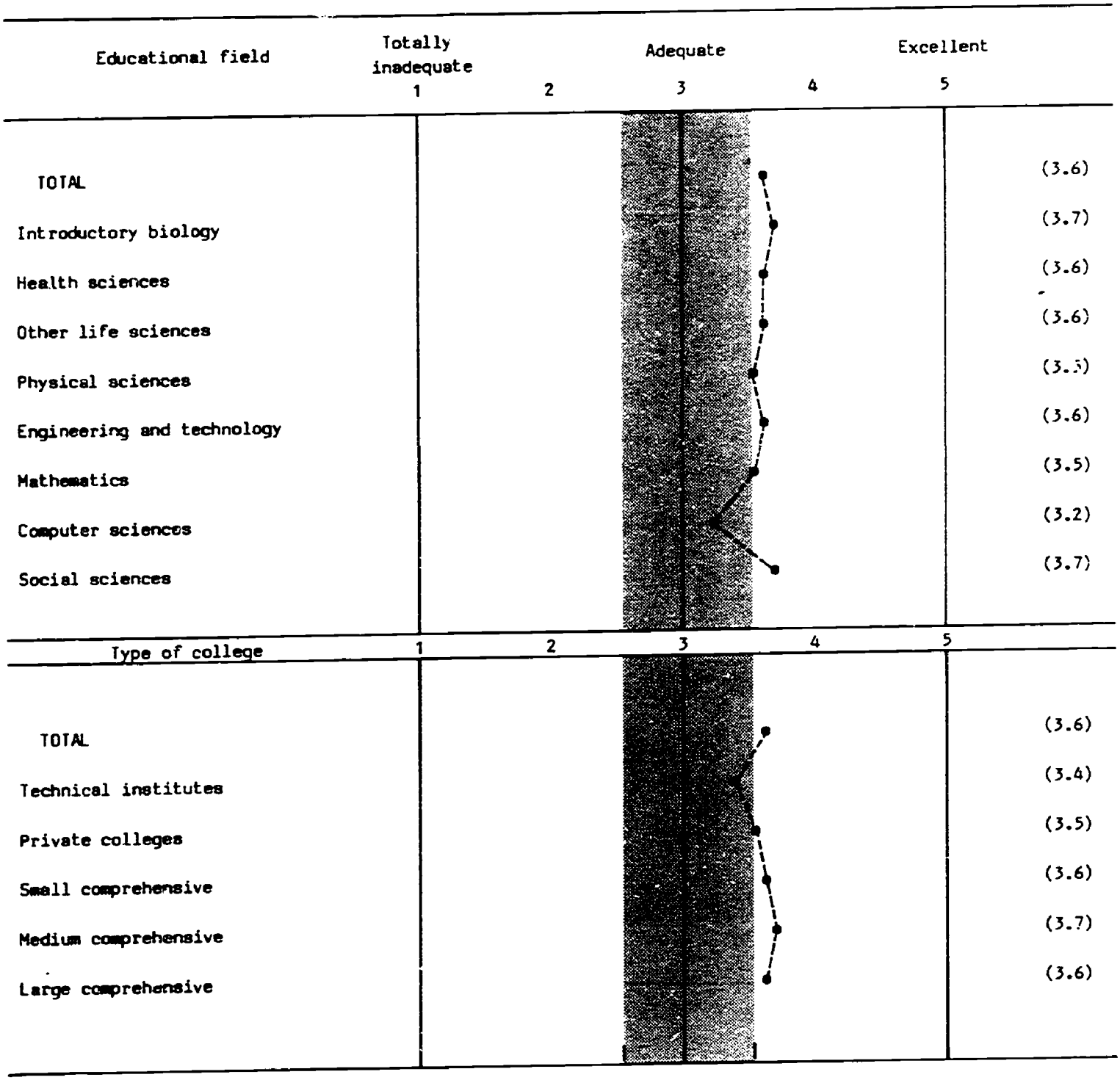


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

16. Availability of professional journals

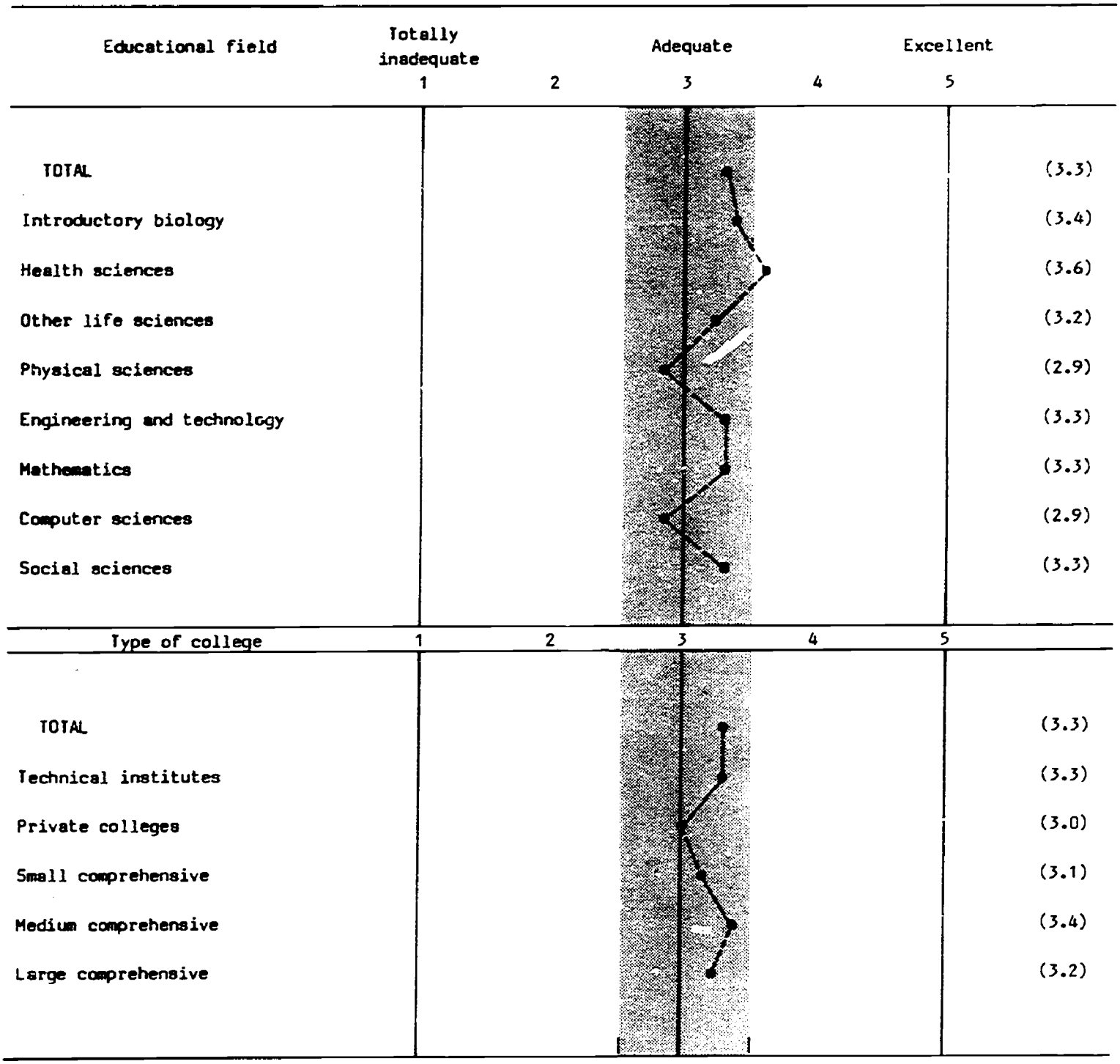


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

17. Opportunities for professional growth

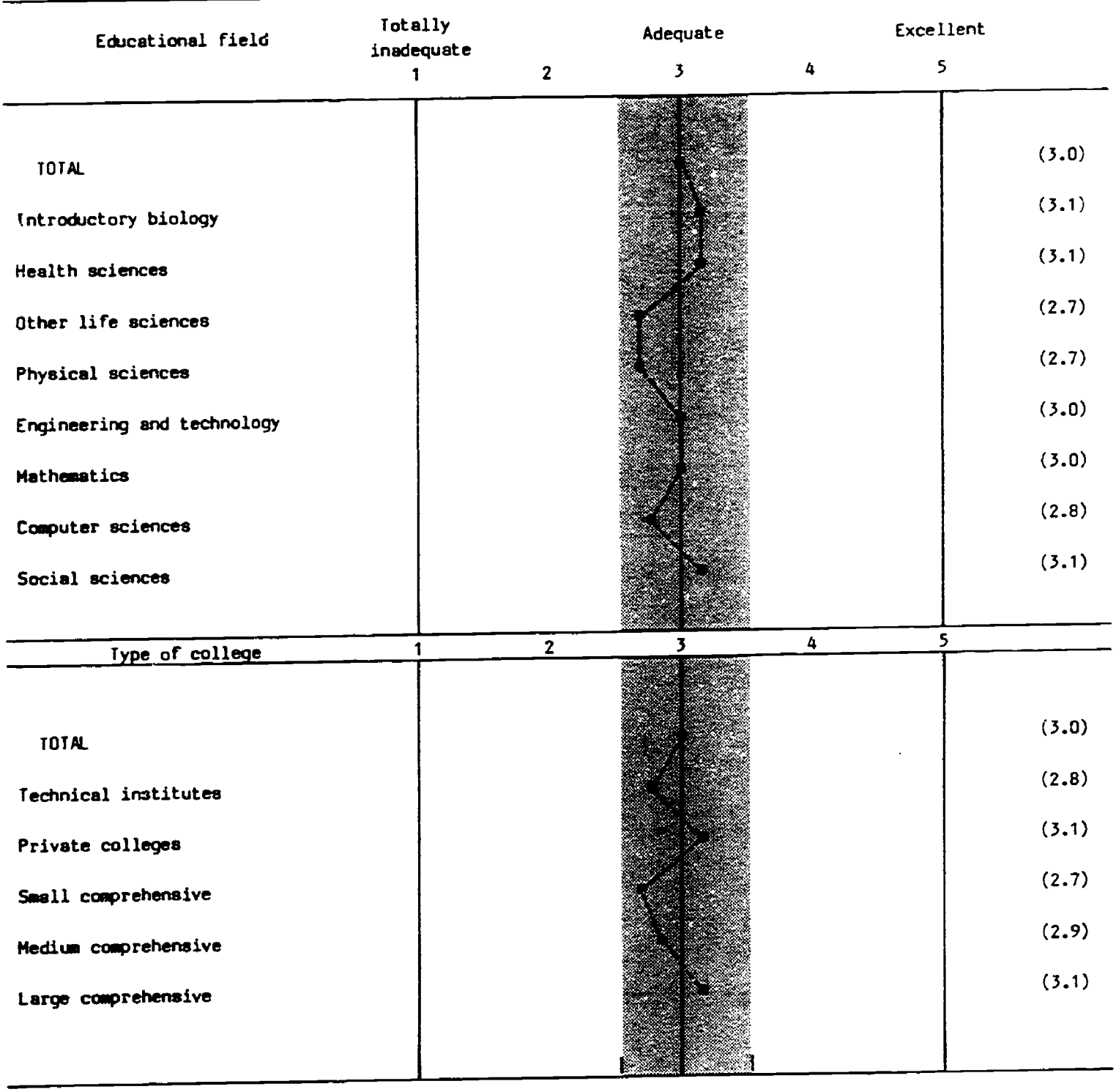


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

18. Teaching environment

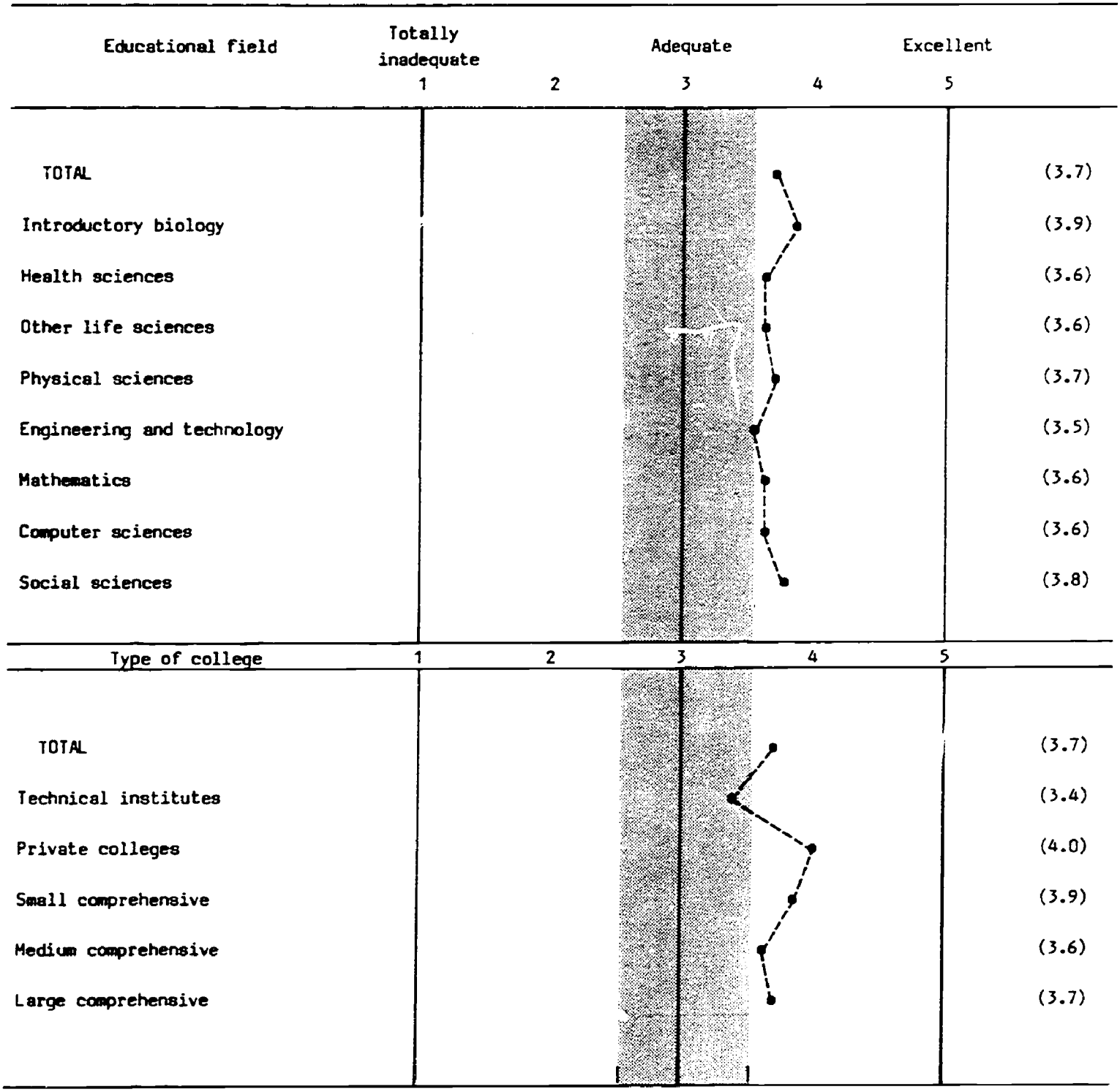


Figure FQ-33. Faculty assessment of 19 institutional characteristics: average ratings, by institutional characteristic, educational field, and type of college (continued)

19. Articulation with transfer institutions' policies on transfer of credits

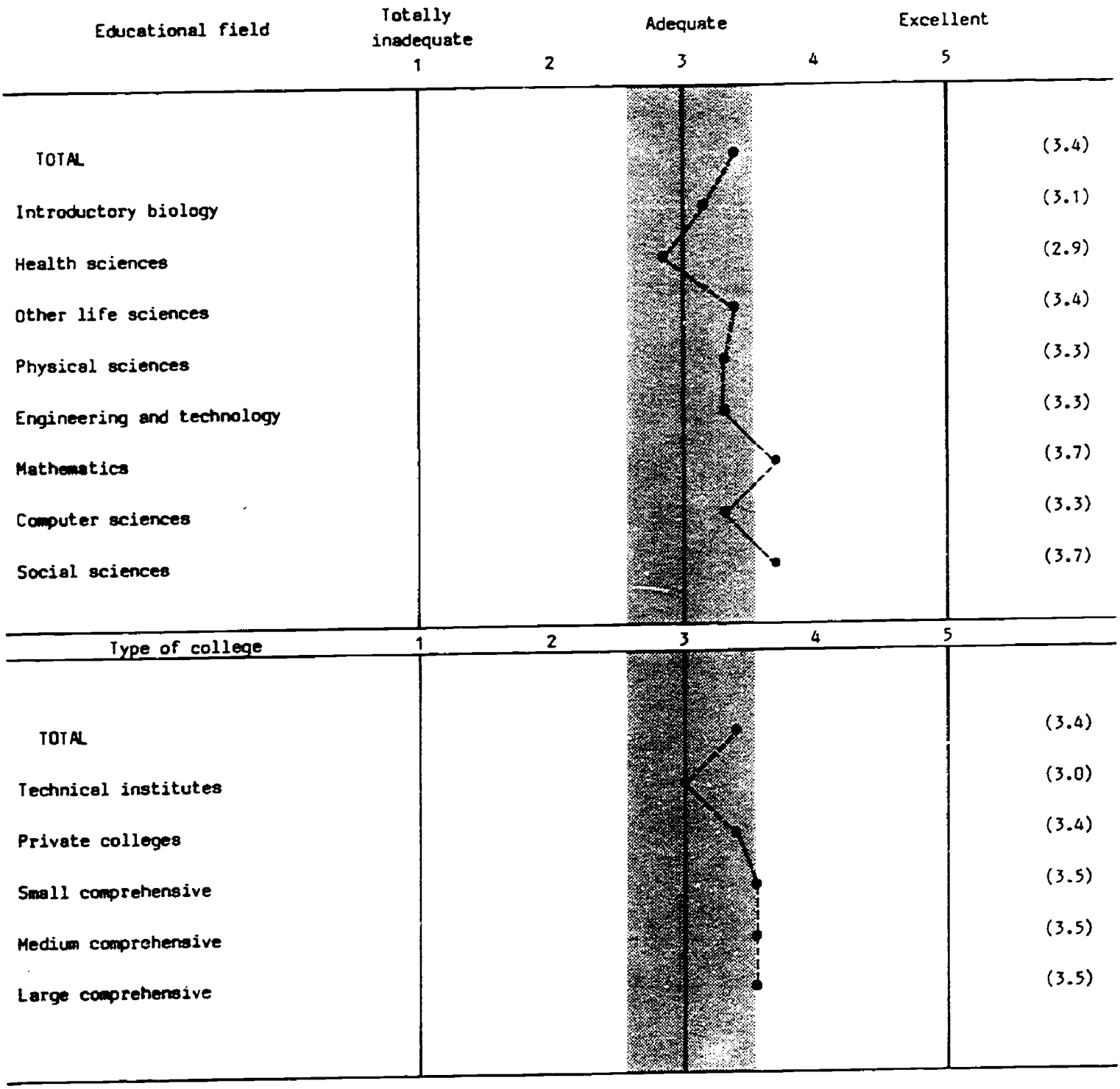


Figure SQ-27. Science majors' assessment of characteristics of their science programs: average ratings, by characteristic, educational field, and type of college

Curriculum structure

Educational field	Totally dissatisfied 1	2	Partially satisfied 3	4	Totally satisfied 5	
TOTAL						(3.9)
Introductory biology						(4.2)
Health sciences						(4.0)
Other life sciences						(3.8)
Physical sciences						(3.9)
Engineering and technology						(3.9)
Mathematics						(3.8)
Computer sciences						(3.9)
Social sciences						(3.8)

Type of college	Totally dissatisfied 1	2	Partially satisfied 3	4	Totally satisfied 5	
TOTAL						(3.9)
Technical institutes						(4.0)
Private colleges						(3.7)
Small comprehensive						(3.8)
Medium comprehensive						(3.9)
Large comprehensive						(3.8)

Figure SQ-27. Science majors' assessment of characteristics of their science programs: average ratings, by characteristic, educational field, and type of college (continued)

Curriculum advising

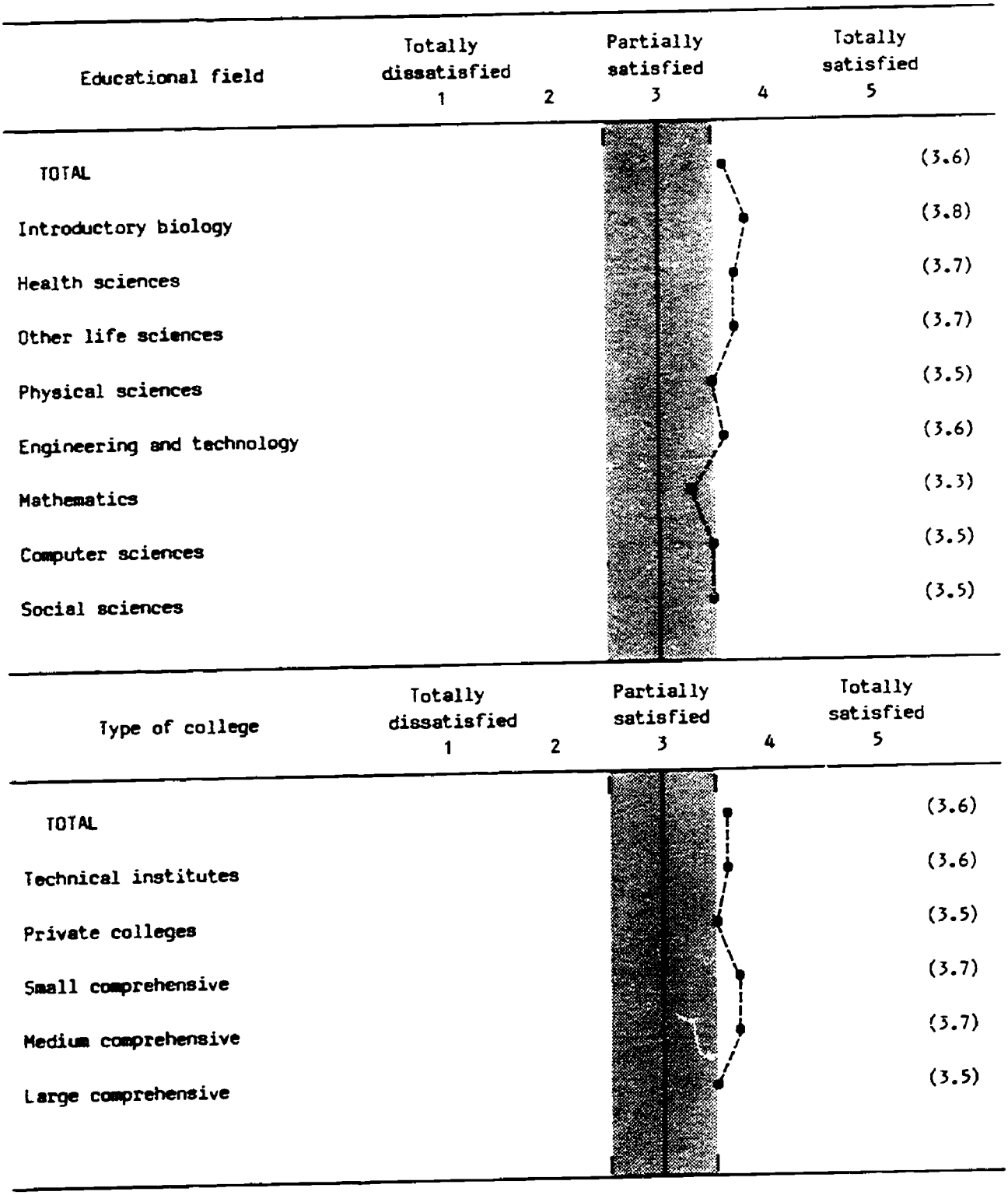
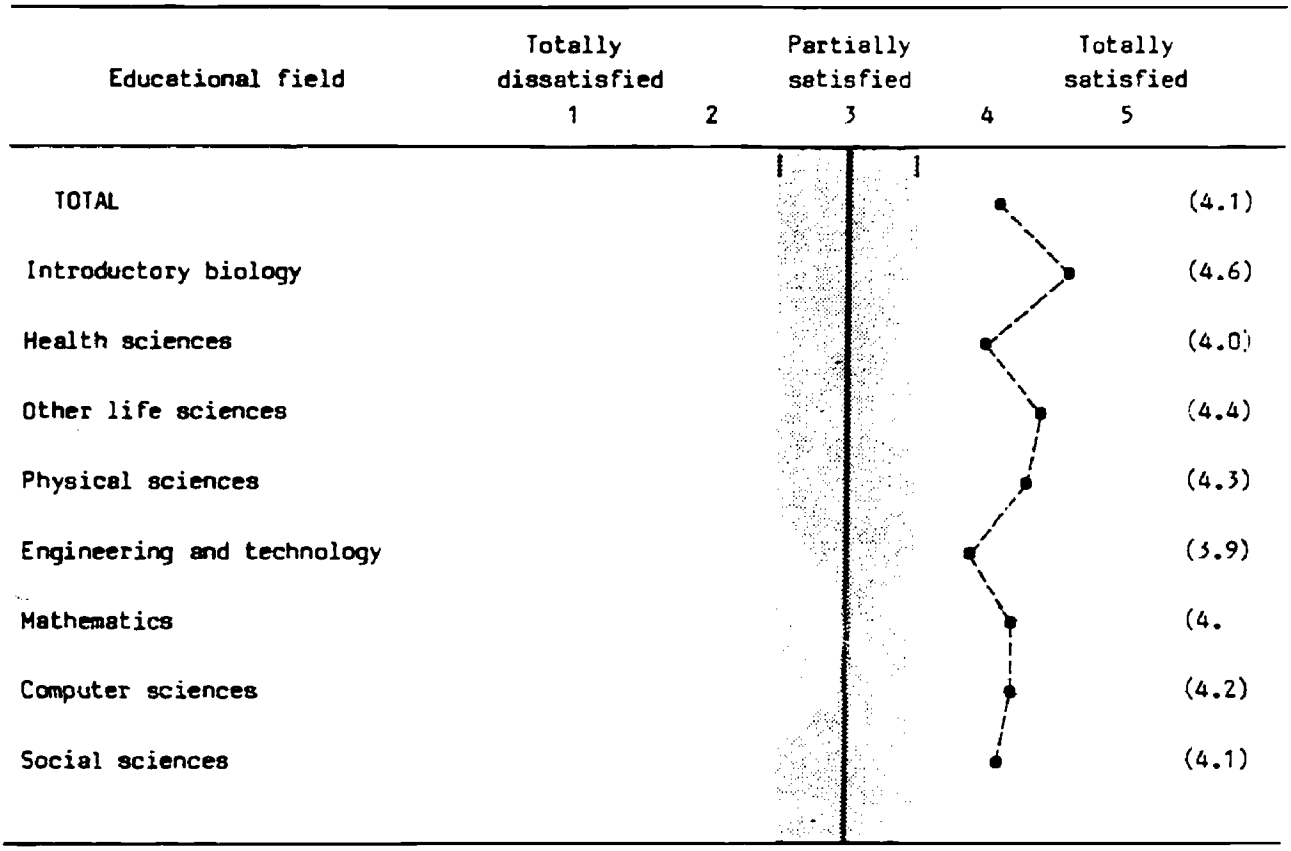


Figure SQ-27. Science majors' assessment of characteristics of their science programs: average ratings, by characteristic, educational field, and type of college (continued)

Classrooms



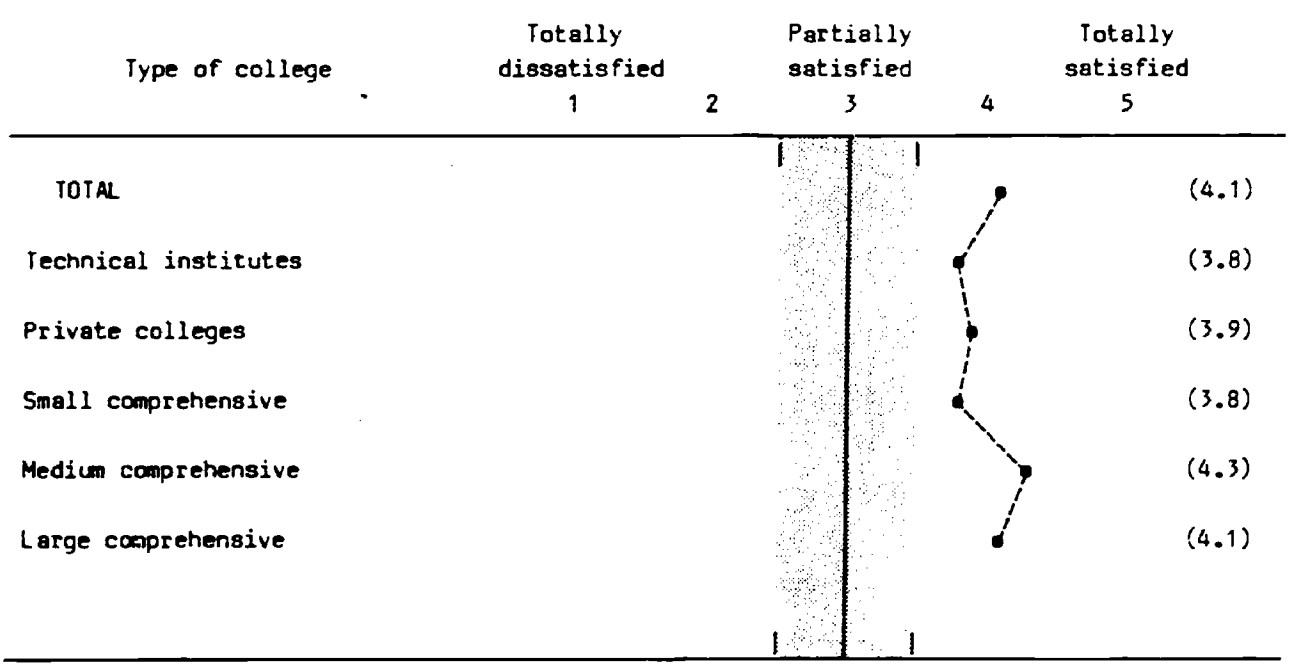
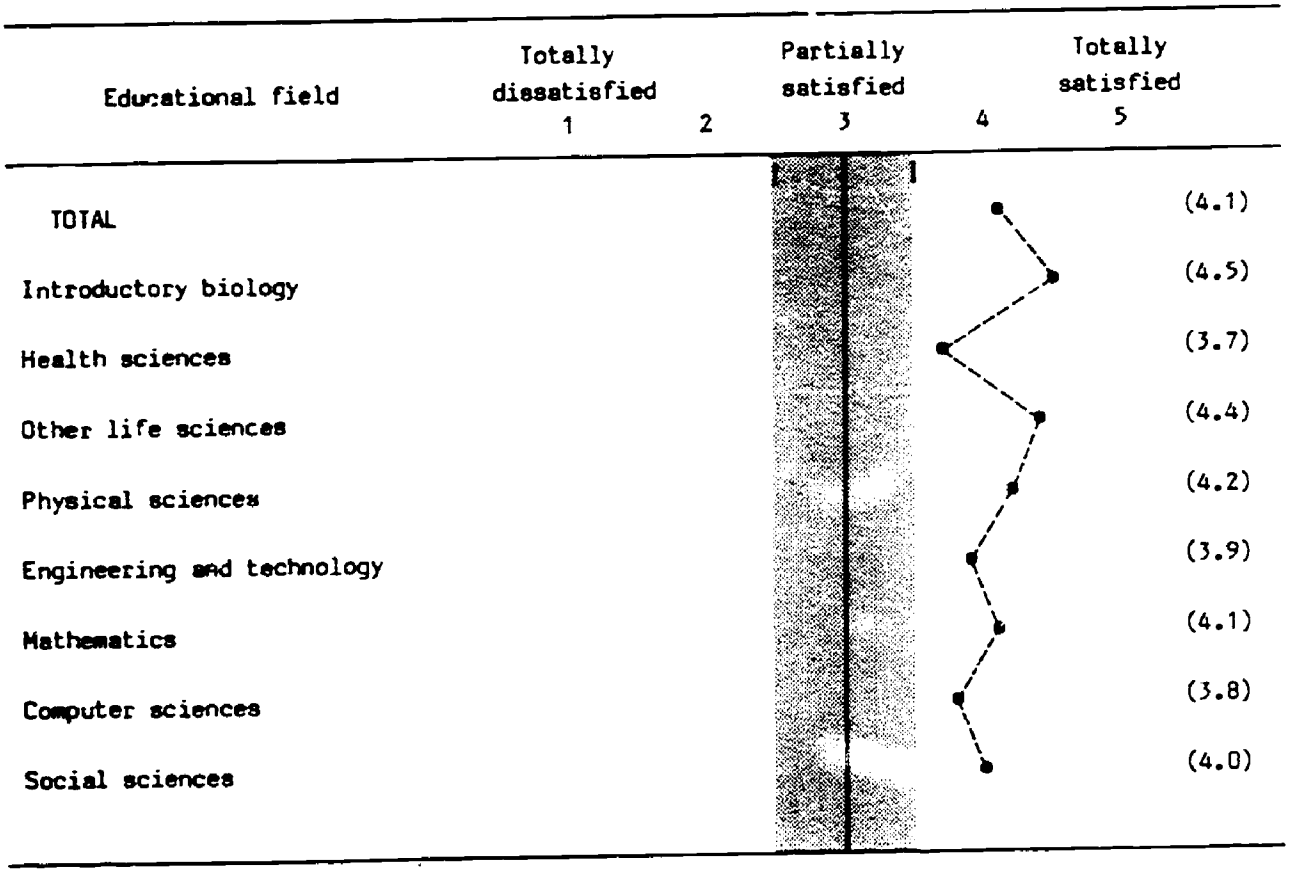


Figure SQ-27. Science majors' assessment of characteristics of their science programs: average ratings, by characteristic, educational field, and type of college (continued)

Lecture halls



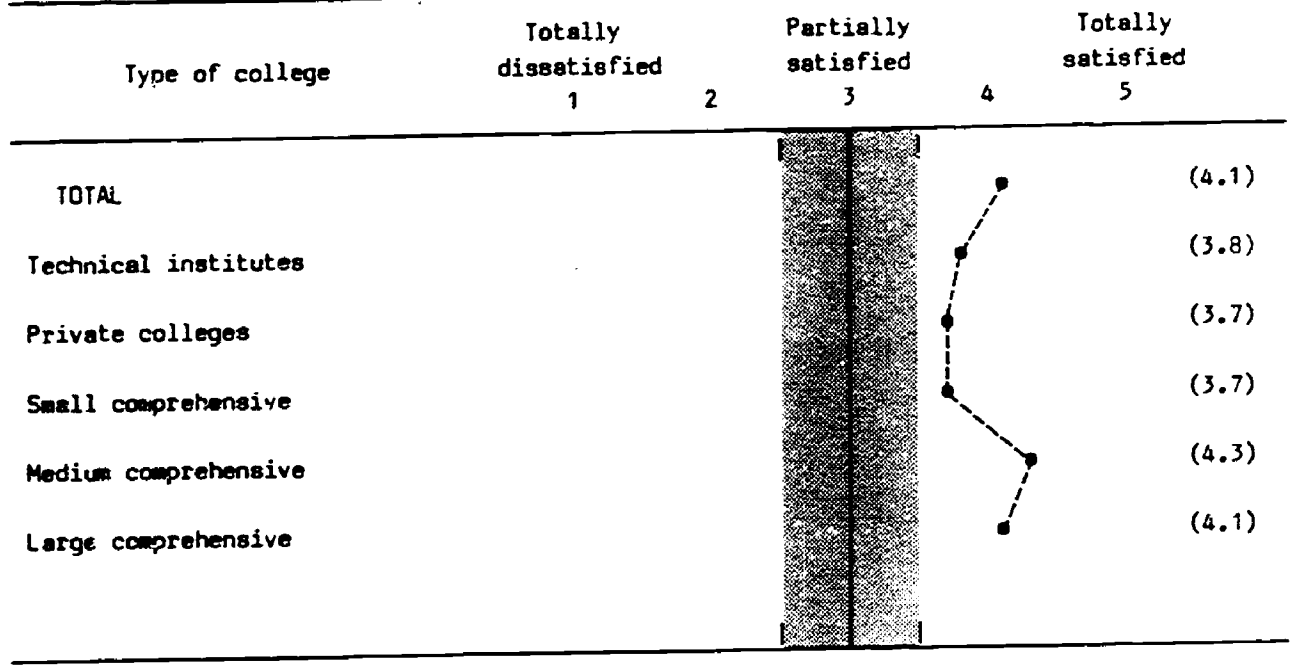
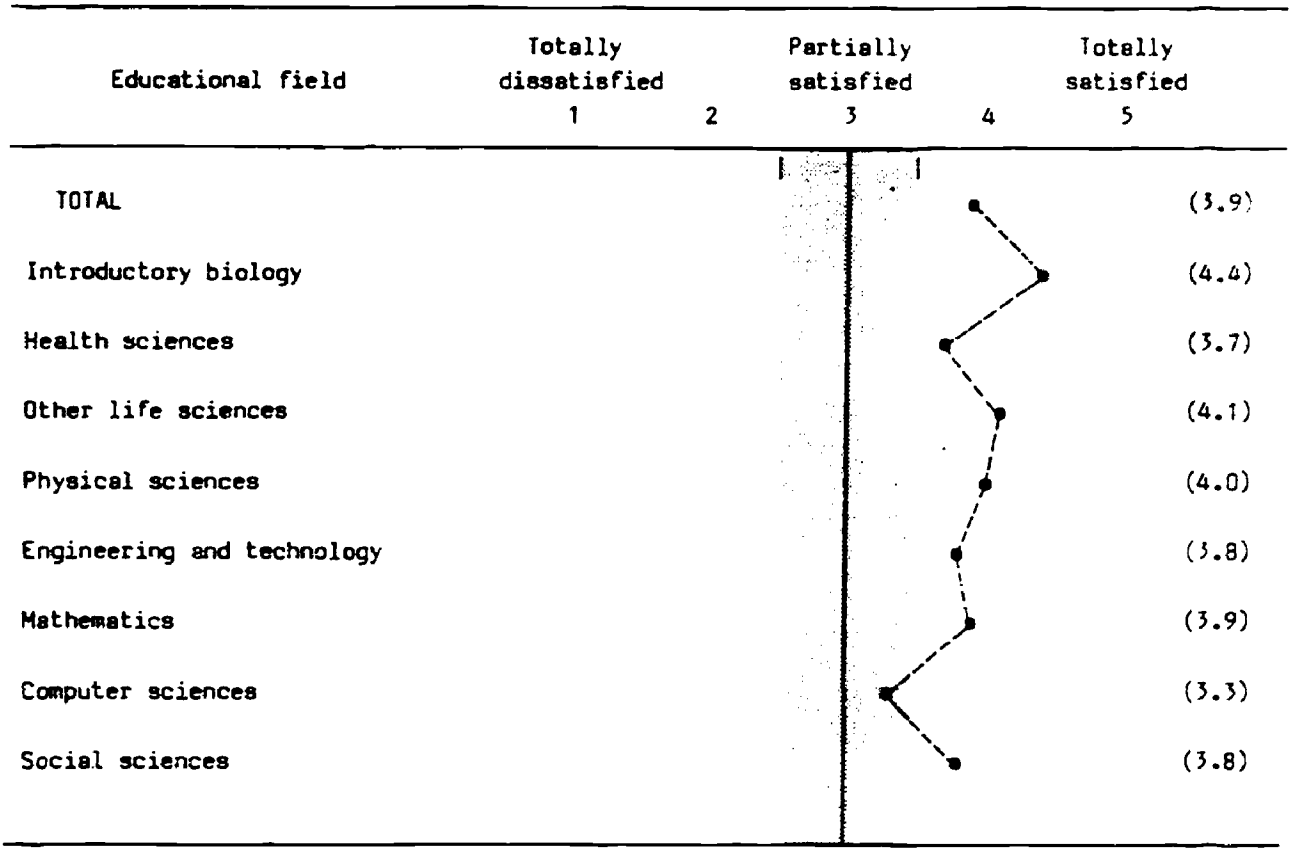


Figure SQ-27. Science majors' assessment of characteristics of their science programs: average ratings, by characteristic, educational field, and type of college (continued)

Laboratory space



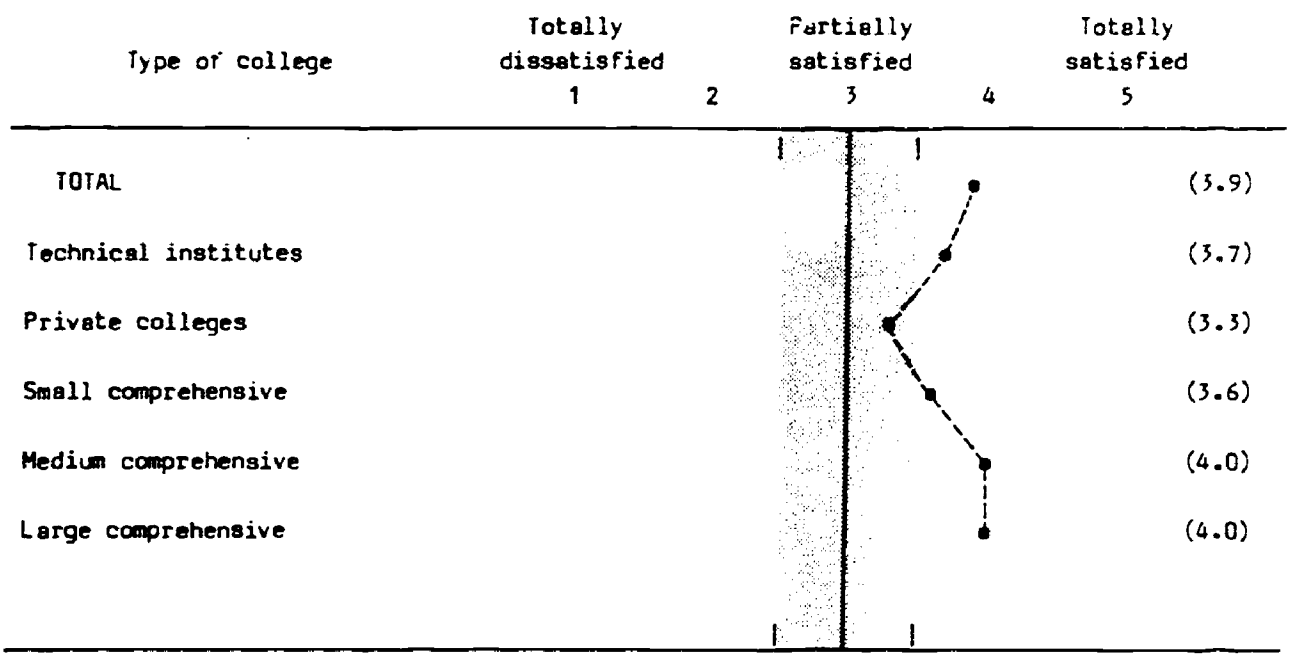


Figure SQ-27. Science majors' assessment of characteristics of their science programs: average ratings, by characteristic, educational field, and type of college (continued)

Laboratory equipment

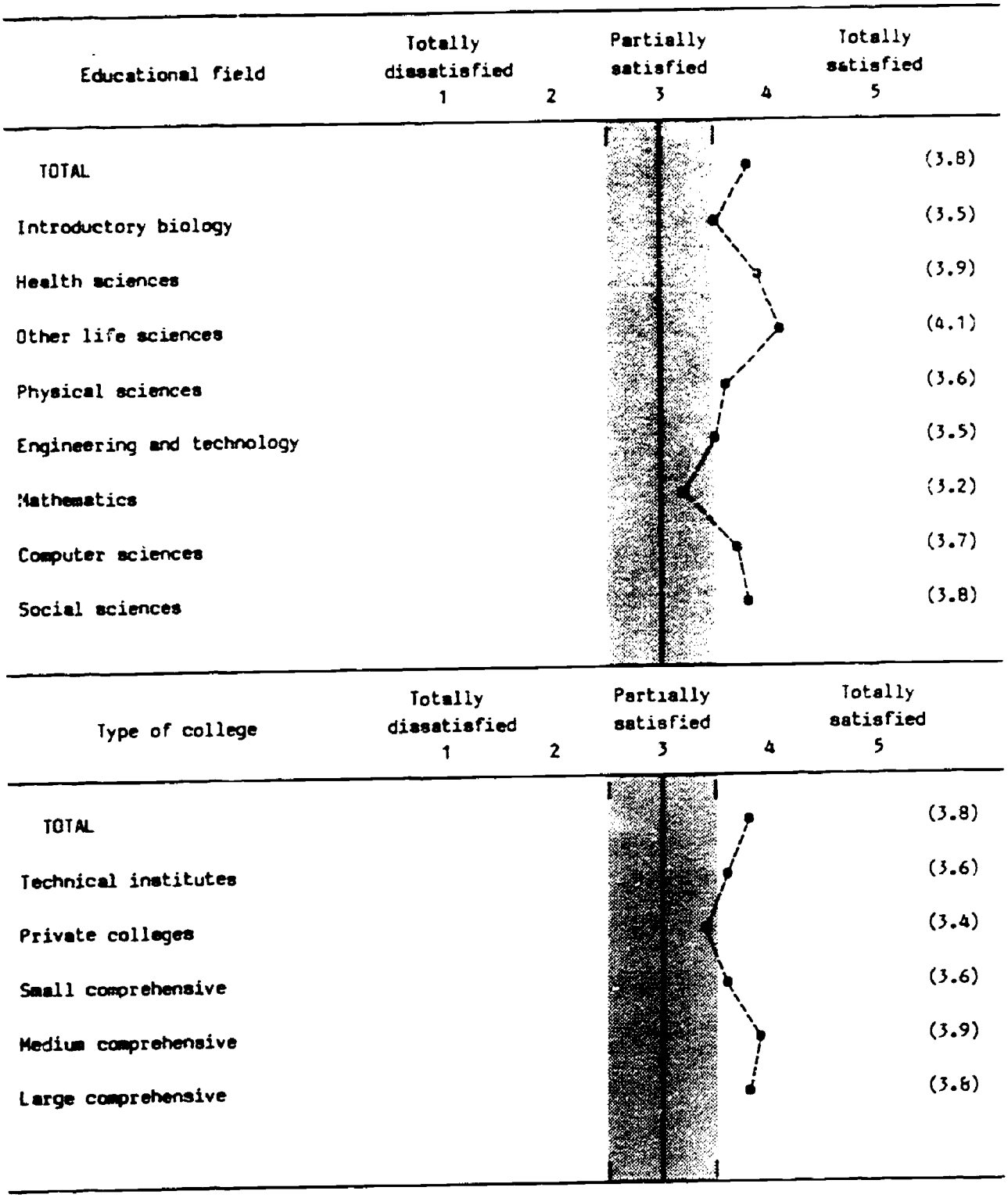


Figure SQ-27. Science majors' assessment of characteristics of their science programs: average ratings, by characteristic, educational field, and type of college (continued)

Scheduling of science courses

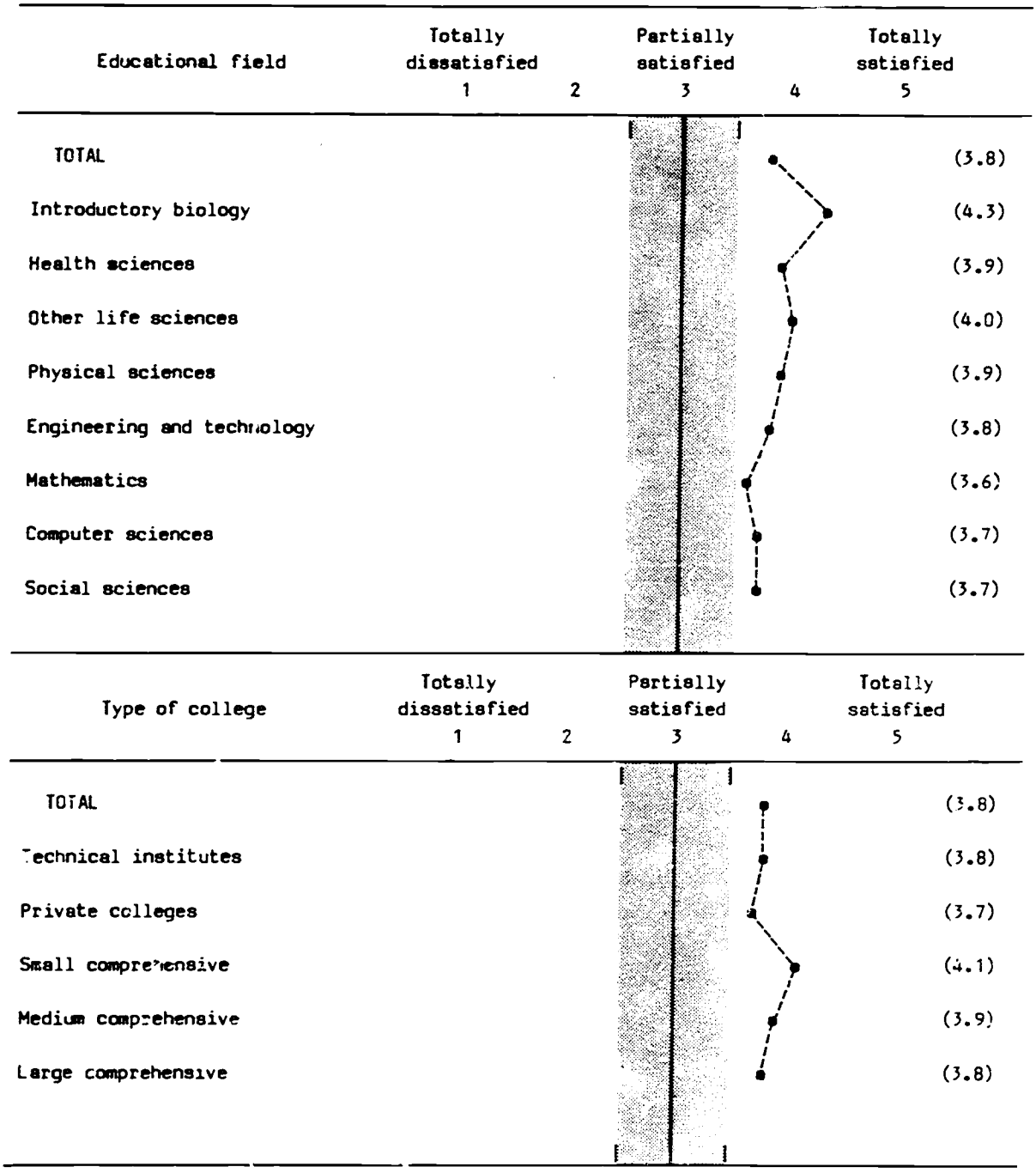


Figure SQ-27. Science majors' assessment of characteristics of their science programs: average ratings, by characteristic, educational field, and type of college (continued)

Size of science classes

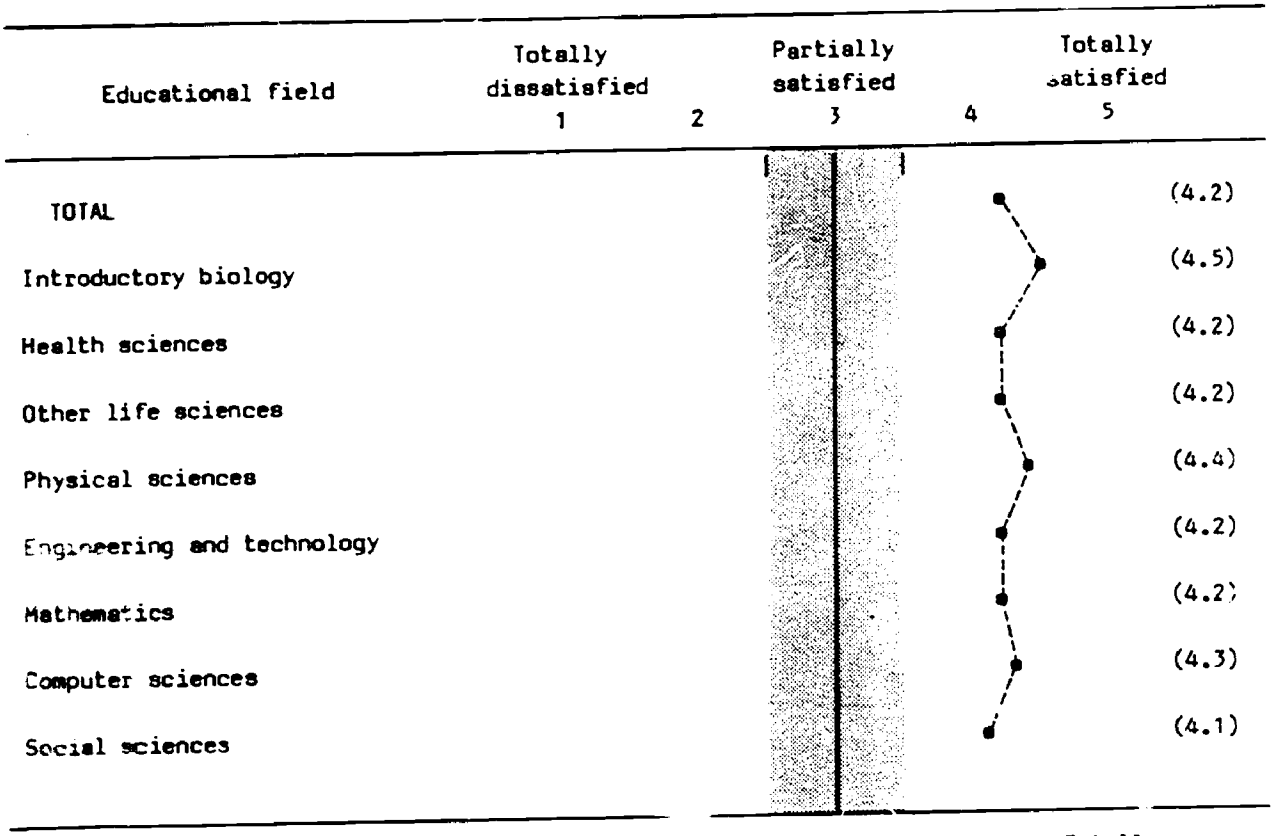


Figure SQ-27. Science majors' assessment of characteristics of their science programs: average ratings, by characteristic, educational field, and type of college (continued)

Library

Educational field	Totally dissatisfied 1	2	Partially satisfied 3	4	Totally satisfied 5	
TOTAL						(3.9)
Introductory biology						(3.9)
Health sciences						(4.0)
Other life sciences						(3.9)
Physical sciences						(3.8)
Engineering and technology						(4.0)
Mathematics						(3.8)
Computer sciences						(3.5)
Social sciences						(3.9)

Type of college	Totally dissatisfied 1	2	Partially satisfied 3	4	Totally satisfied 5	
TOTAL						(3.9)
Technical institutes						(3.8)
Private colleges						(3.5)
Small comprehensive						(4.0)
Medium comprehensive						(4.0)
Large comprehensive						(4.0)

Figure SQ-27. Science majors' assessment of characteristics of their science programs: average ratings, by characteristic, educational field, and type of college (continued)

Audiovisual materials

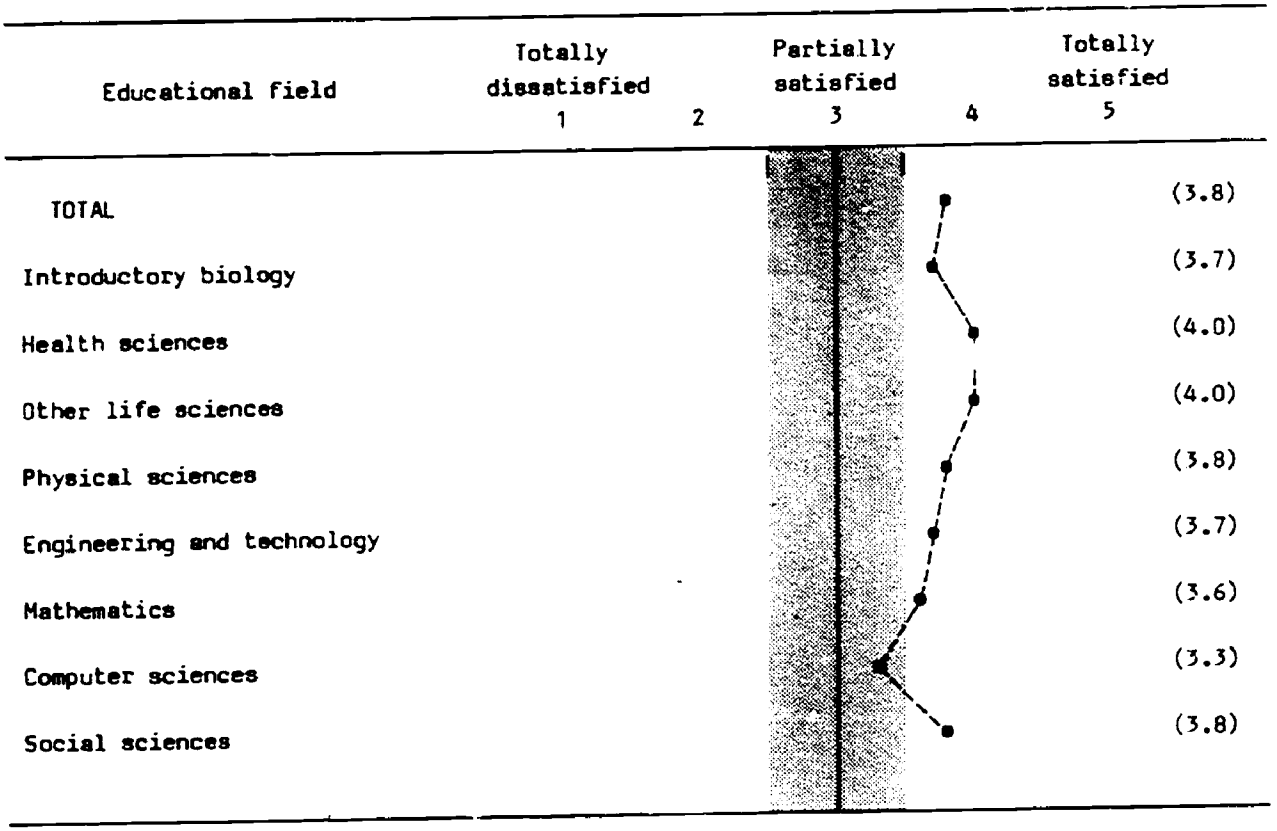
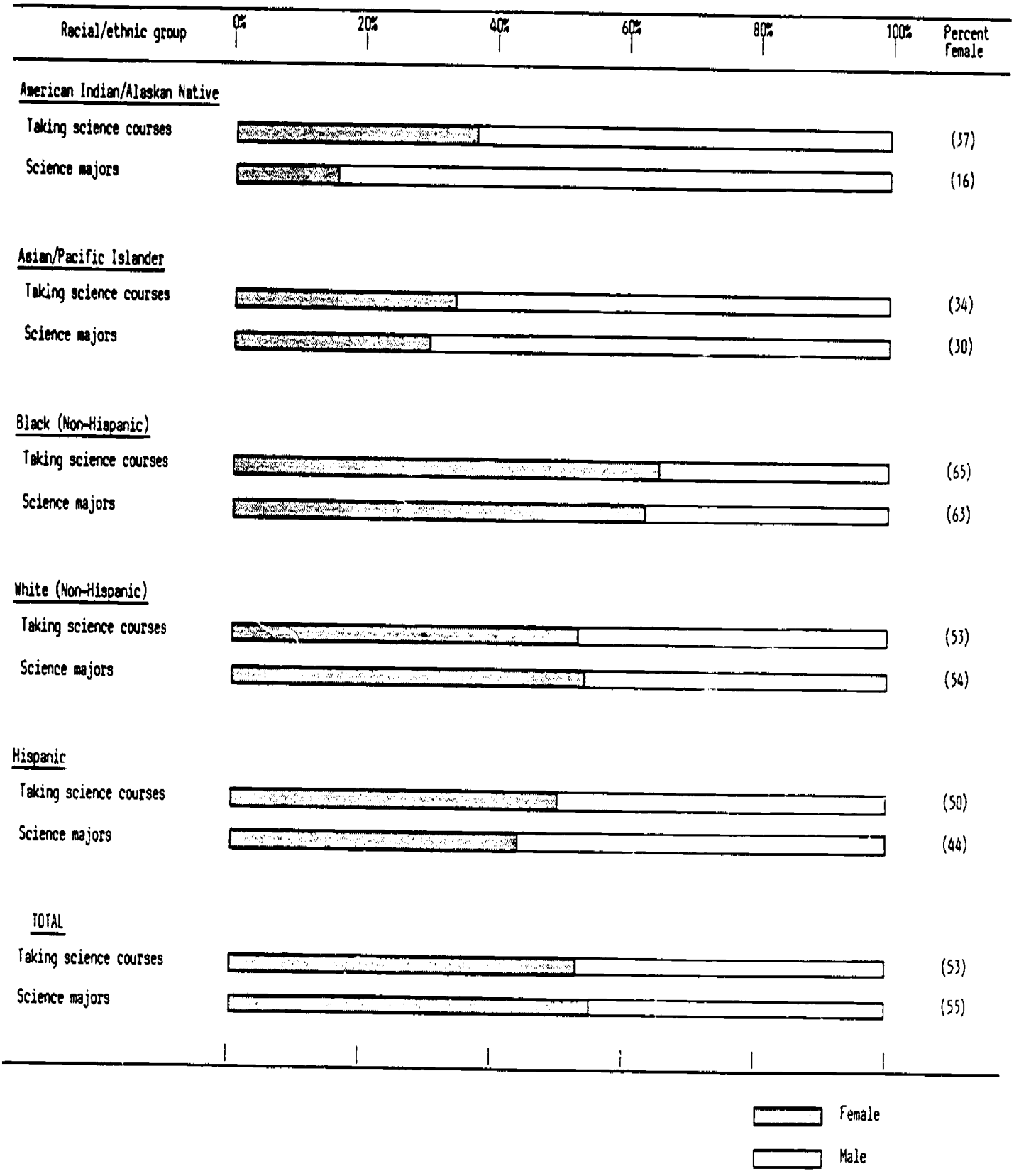


Figure SQ-(A). Percent distribution of students taking science courses and students majoring in science, by racial/ethnic group and sex



APPENDIX E

Survey Questionnaires

LIST OF QUESTIONNAIRES

INSTITUTIONAL QUESTIONNAIRE

National Science Education
Survey

April 1979

If this campus is a part of a university, state, or multi-campus system, enter the name of the system below.

_____

_____

QUESTION 1 CALLS FOR AN OVERALL ASSESSMENT OF THE COLLEGE'S NEEDS IN SCIENCE EDUCATION. SUBSEQUENT QUESTIONS IN THIS SECTION (Q.2-Q.5) REQUEST MORE DETAILED INFORMATION.

1. Attachment 1 contains a list of codes and corresponding educational fields or disciplines in science and technology. Indicate which of these fields (for programs that are currently operating) critically need improvement. (FOR EACH FIELD THAT NEEDS IMPROVEMENT CIRCLE NUMBERS FOR ALL TYPES OF IMPROVEMENT NEEDED. THEN RANK ORDER THE THREE EDUCATIONAL FIELDS THAT HAVE TOP PRIORITY BEGINNING WITH 1 AS THE HIGHEST.)

Educational field (Code)	Priority	Type(s) of improvement needed				
		Facilities	Equipment	Restructuring of course content	Instructional methodologies	Faculty development
	( )	1	2	3	4	5
	( )	1	2	3	4	5
	( )	1	2	3	4	5
	( )	1	2	3	4	5
	( )	1	2	3	4	5
	( )	1	2	3	4	5
	( )	1	2	3	4	5
	( )	1	2	3	4	5
	( )	1	2	3	4	5
	( )	1	2	3	4	5

(CIRCLE HERE IF NO IMPROVEMENTS ARE NEEDED) 1

2. Facilities Improvements

For those educational fields listed in Question 1 that need equipment and/or facilities improvement, indicate below the kinds of improvements needed. (CIRCLE ALL THAT APPLY):

Educational field	Lecture-demonstration		Laboratories					
			General purpose		Specialized		Self-instructional media-assisted	
	Construction or renovation	Specialized hardware for science/technology	Construction or renovation	Major equipment	Construction or renovation	Major equipment	Construction or renovation	Major equipment
☐☐☐	1	2	3	4	5	6	7	8
☐☐☐	1	2	3	4	5	6	7	8
☐☐☐	1	2	3	4	5	6	7	8
☐☐☐	1	2	3	4	5	6	7	8
☐☐☐	1	2	3	4	5	6	7	8
☐☐☐	1	2	3	4	5	6	7	8
☐☐☐	1	2	3	4	5	6	7	8
☐☐☐	1	2	3	4	5	6	7	8
☐☐☐	1	2	3	4	5	6	7	8
☐☐☐	1	2	3	4	5	6	7	8

(CIRCLE HERE IF NO FACILITIES IMPROVEMENT IS NEEDED). 1

3. What percent of the facilities available for science and technology are in need of improvement?

(CIRCLE ONE)

Less than 25 percent. 1
25 to 49 percent. 2
50 to 75 percent. 3
Over 75 percent 4

4. If this college campus needs major construction or hardware (e.g., computer installation) not already included in Questions 1 through 3, please list them below. (IF NONE ENTER "NONE" BELOW):

_____

_____

_____

_____

_____

_____

_____

5. How adequate are the instructional media available to this campus in facilitation science instruction? (CIRCLE THE APPROPRIATE NUMBER FOR EACH ITEM)

	Totally inadequate				Completely adequate
Book collection.	1	2	3	4	5
Discipline-oriented journals . . .	1	2	3	4	5
General interest periodicals . . .	1	2	3	4	5
Reference volumes.	1	2	3	4	5
Audio-visual media:					
Facilities	1	2	3	4	5
Software	1	2	3	4	5
Hardware	1	2	3	4	5
Efficiency of acquiring media materials requested	1	2	3	4	5

QUESTIONS 6 THROUGH 11 ARE CONCERNED WITH THE PROFESSIONAL NEEDS OF SCIENCE FACULTY IN ORDER TO KEEP CURRENT IN THEIR FIELDS.

FACULTY DEVELOPMENT

6. What percent of the science faculty have a critical need for improvement in each of the following aspects of teaching? (CIRCLE ONE NUMBER FOR EACH ASPECT.)

Aspects of teaching	Percent				
	Less than 20	20 to 39	40 to 59	60 to 79	More than 80
Knowledge of content in teaching field. .	1	2	3	4	5
Teaching methods (including instructional media)	1	2	3	4	5
Practical work experience related to field of teaching	1	2	3	4	5
Attitudes toward teaching	1	2	3	4	5
Other (SPECIFY) _____	1	2	3	4	5

7. Which of the following options would be most effective in meeting the need for faculty improvement in science instruction for each of the teaching aspects shown below? (CIRCLE THE APPROPRIATE NUMBER(s) FOR EACH COLUMN)

Faculty improvement options	Aspects of teaching			
	Knowledge of content	Teaching methods	Practical work experience	Attitudes toward teaching
In-service program, part-time during school year.	01	01	01	01
Full-time academic year	02	02	02	02
Short-duration academic year program (e.g., weekends, holidays).	03	03	03	03
Full-time summer program	04	04	04	04
Short-duration summer program . . .	05	05	05	05
Self-study materials	06	06	06	06
Attendance at professional meetings.	07	07	07	07
Accessibility of professional literature	08	08	08	08
Other (SPECIFY) _____	09	09	09	09

8. During the last five years, what percent of the science faculty has taken advantage of opportunities for self improvement such as those listed in Question 7?

(CIRCLE ONE)

Less than 20 1
20 - 39 2
40 - 59 3
60 - 80 4
Over 80 5

9. What percent of the faculty members (i.e., head count) teaching in scientific fields at this college campus are part-time? (PLEASE REFER TO ATTACHMENT 1 FOR LISTING OF FIELDS TO BE INCLUDED.)

(CIRCLE ONE)

Less than 20 1
20 - 39 2
40 - 59 3
60 - 80 4
Over 80 5
NONE (SKIP TO Q.13) 6

10. What percent of the course sections in scientific fields is taught by part-time instructors?

(CIRCLE ONE)

Less than 10 1
10 - 19 2
20 - 29 3
30 - 39 4
40 - 50 5
Over 50 percent 6

11. How does this college define a part-time faculty member?

_____

_____

_____

12. Please check the single most important reason for using part-time faculty for teaching in the science fields at this college.

(CIRCLE ONE)

Excess of course sections, but insufficient to justify another full-time instructor 1
Full-time instructor not available 2
Course requiring specialized background not available among full-time faculty 3
Necessary to save on costs of instruction 4
Other (SPECIFY) _____ 5

QUESTIONS 13 THROUGH 15 REFER TO STUDENTS NEEDS IN SCIENCE EDUCATION ON THIS CAMPUS

13. The following have frequently been identified as needs of students in two-year colleges. Identify those student needs that are of particular concern on this campus. (RANK ORDER THE CIRCLED ITEMS ACCORDING TO THEIR PRIORITY, BEGINNING WITH 1 AS HIGHEST.)

	(CIRCLE ALL THAT APPLY)	RANK ORDER
DEVELOPMENT OF BASIC SKILLS		
Language skills	1	
Math skills	2	
Study skills	3	
Basic manipulative skills for laboratory work	4	
Counseling on their need for basic skills	5	
OTHER NEEDS		
Advanced courses	6	
Honors courses	7	
Opportunities for practical experience	8	
Counseling for careers	9	
Courses offered more frequently than once a year	10	
Restructuring of courses and/or laboratory practices for use of non-traditional instructional methods	11	
Supplementary learning materials	12	
Increased access to college resources:		
Library/learning resources	13	
Laboratories	14	
Faculty	15	

14. What methods does this college use to encourage the enrollment of the following student groups in science and technology? (CIRCLE ALL THAT APPLY)

	Women	Minorities	Handicapped
Recruitment directed toward the groups	1	1	1
Special courses	2	2	2
Faculty sensitive to the needs of the group	3	3	3
Institutional policies and procedures	4	4	4
Auxiliary personnel trained to assist	5	5	5
Other (PLEASE SPECIFY) _____	6	6	6
Nothing special	7	7	7

15. Has the college provided for physical access of handicapped students to science and technology classes?

(CIRCLE ONE)

Completely 1
Partially 2
Not at all 3

QUESTIONS 16 THROUGH 19 REFER TO THE PLANNING PROCESS FOR NEW COURSES AND PROGRAMS ON THIS CAMPUS.

16. How many months does it usually take a proposal for a new course or program to gain approval through the college level (including Board of Trustees)?

A new course ___ ___ Months
A new curricular program ___ ___ Months

17. Once approval for a new course or program is gained at the college level, how many months does it take for any other approvals to be obtained?

A new course ___ ___ Months
A new curricular program ___ ___ Months

18. After gaining necessary approvals, how many months does it usually take before students are enrolled in the first class?

A new course ___ ___ Months
A new curricular program ___ ___ Months

19. List the programs or curricula in science and technology not now offered on this campus for which a need has been identified in your community. Also indicate status of plans for introducing the program. (CIRCLE ONE FOR EACH PROGRAM)

Program	Definite plans exist	Plans are anticipated or under development	No plans anticipated
1. _____	1	2	3
2. _____	1	2	3
3. _____	1	2	3
4. _____	1	2	3

QUESTIONS 20 THORUGH 22 ARE CONCERNED WITH PRACTICES AND PROBLEMS OF ARTICULATION WITH FOUR-YEAR OR UPPER DIVISION INSTITUTIONS.

20. Does this college campus have formal arrangements with four-year colleges and/or universities for the transfer of credits?

(CIRCLE ONE)

Yes 1
No 2

21. Rank the following potential articulation problems for students transferring to four year institutions from this college campus (BEGIN WITH 1 AS MOST IMPORTANT; IF AN ITEM IS NOT A PROBLEM, ENTER ZERO FOR THE ITEM):

RANK

Receiving institution does not accept our courses . . . . . ( )
Receiving institution accepts our courses but will not credit them toward major requirements . . . . . ( )
Receiving institution considers our courses upper division . . . . . ( )
Receiving institution considers our courses remedial . . . . . ( )
Other (SPECIFY) _____ ( )

22. Are courses in technology causing articulation problems different from those for science?

(CIRCLE ONE)

Yes 1
No 2

If yes, please specify reasons:

_____

_____

_____

QUESTIONS 23 AND 24 REQUEST INFORMATION ABOUT THIS COLLEGE CAMPUS

23. Which of the following best describes this college campus? Is it:

(CIRCLE ONE)

Part of a state system of two-year colleges 1
Part of a university system 2
Part of a local or regional multi-campus system 3
Not affiliated with any other college campus 4

24. What was the total enrollment (full-time plus part-time) for this campus for the Fall session of 1978?

(CIRCLE ONE)

less than 500 1
500 - 1,499 2
1,500 - 2,499 3
2,500 - 4,999 4
5,000 - 7,499 5
7,500 - 15,000 6
over 15,000 7

25. What sources were used to supply information for this questionnaire?

(CIRCLE ALL THAT APPLY)

Records of departmental requests 1
College office of institutional research 2
College budget requests 3
Planning documents 4
College self-study report 5
Accreditation team report 6
Generally accepted professional standards 7
State-recommended standards 8
Access to other records not mentioned above 9
Internal suggestion now being evaluated 10
External suggestion now being evaluated 11
Consultation with department chairperson 12
Consultation with department faculty 13
Consultation with knowledgeable administrative staff 14
Professional judgement of person responsible for this questionnaire . .15

ATTACHMENT 1

EDUCATIONAL FIELDS

Please use this classification to respond to Questions 1 and 2 of this questionnaire.

Where the general fields have been divided into finer categories, please use the categories as much as possible. When no applicable category is given, use the broader classification.

CODE	FIELD
010	Agriculture and National Resources
020	Biological Sciences
021	Botany
022	Ecology
023	Microbiology
024	Physiology and Human Anatomy
025	Zoology
030	Computer and Information Sciences
040	Engineering
050	General Science and Interdisciplinary Sciences
060	Mathematics
070	Nursing
080	Physical Sciences
081	Astronomy
082	Chemistry
083	Earth Sciences
084	Physics
090	Social Sciences
091	Anthropology
092	Economics
093	Geography
094	Political Science (Government)
095	Psychology
096	Sociology

CODE	FIELD
100	Mechanical, Engineering, and Natural Science Technologies
101	Aeronautical and Aviation Technologies
102	Agricultural Technologies
103	Architectural Drafting Technologies
104	Chemical Technologies
105	Civil Technologies
106	Electromechanical Technologies
107	Electronic Technologies
108	Forestry and Wildlife Technologies
109	Home Economics Technologies
110	Industrial Technologies
111	Instrumentation Technologies
112	Laboratory Technologies (General)
113	Marine and Oceanographic Technologies
114	Mechanical Technologies
115	Nuclear Technologies
116	Textile Technologies
120	Health Related Occupations
121	Clinical Laboratory Services
122	Dental Services
123	Dietetic and Nutritional Services
124	Medical Instrumentation and Machine Operation
125	Mental Health
126	Nursing Related Services
127	Radiological Services
128	Other Health Related Occupations

FACULTY QUESTIONNAIRE

National Science Education
Survey

April 1979

_____
Your Academic Rank

QUESTIONS 1 THROUGH 3 REFER THE COURSE SECTION IDENTIFIED ON THE FRONT THIS QUESTIONNAIRE

1. How many students were officially registered for this class section for the first day of classes?

___ ___ ___
NUMBER

2. How many students are currently registered in this class section?

___ ___ ___
NUMBER

3. Indicate all the items which describe this course.

(CIRCLE ALL THAT APPLY)

Parallel or equivalent to a lower division college level course at transfer institutions 1

For transfer students majoring in one of the natural resources fields (e.g., agriculture, forestry) or an allied health field (e.g., nursing, dental hygiene) 2

For transfer students majoring in one of the physical or biological sciences, engineering, mathematics, or the health sciences (e.g., pre-medicine, pre-dentistry) 3

For transfer students majoring in a non-science area (e.g., arts, humanities, history) 4

For transfer students majoring in social sciences 5

For occupational students in a science technology or engineering technology area 6

For occupational students in an allied health area 7

For continuing education or personal upgrading of adult students 8

A high school make-up or remedial course 9

A general education course for non-transfer and non-occupational students 10

Other (specify) _____ 11

_____

QUESTIONS 4 THROUGH 12 REQUEST BACKGROUND INFORMATION ABOUT YOU

4. What is your sex?

(CIRCLE ONE)

Male 1
Female 2

5. How old were you on your last birthday?

(CIRCLE ONE)

Less than 25 1
26 - 29 2
30 - 39 3
40 - 49 4
50 - 59 5
60 and over 6

6. Please indicate your earned degrees, the year the degree was awarded, and the major field of the degree. (REFER TO ATTACHMENT 1F FOR CLASSIFICATION OF FIELDS AND ENTER CODES BELOW.)

DEGREE	Major field (CODE FROM ATTACHMENT 1F)	Calendar year degree awarded
Doctorate (including PhD, EdD and MD)	___ ___ ___	19 ___ ___
Master's degree	___ ___ ___	19 ___ ___
Bachelor's degree	___ ___ ___	19 ___ ___
Associate degree	___ ___ ___	19 ___ ___
No earned degree	___ ___ ___	19 ___ ___
Other earned degrees (SPECIFY) _____	___ ___ ___	19 ___ ___

7. What additional formal study have you undertaken for which a degree was not awarded? (REFER TO ATTACHMENT 1F AND ENTER APPROPRIATE FIELD CODE. IF NONE, ENTER ZEROS BELOW.)

Field (1)	Field (2)
___ ___ ___	___ ___ ___

QUESTIONS 8 AND 9 REQUEST INFORMATION ON YEARS OF TEACHING EXPERIENCE. FOR FULL-TIME AND PART-TIME TEACHING USE THE DEFINITIONS IN EFFECT AT THE INSTITUTION WHERE YOU WERE TEACHING.

8. Indicate below the total number of years you have been teaching.

___ ___
Total years

9. Of the total years you have been teaching, indicate below the number of years you were primarily teaching full-time and the number of years you were primarily teaching part-time at the following levels.*

	Primarily full-time	Primarily part-time
Two-year college	___ ___	___ ___
Four-year college or university	___ ___	___ ___
Pre-college	___ ___	___ ___

*Years teaching full-time plus years teaching part-time should equal the total number of years indicated in Q.8.

10. How many years of non-teaching employment experience have you had in the field in which you are currently teaching? (ROUND TO THE NEAREST FULL YEAR. IF NONE, ENTER ZEROS BELOW)

___ ___
Years

11. What is your present teaching status at this college campus? (CIRCLE ONE)

Full-time 1
Part-time 2

12. In addition to your teaching responsibilities, what other positions do you hold at this college campus? (CIRCLE ALL THAT APPLY)

Department or division chairperson 1
Dean or associate/assistant dean 2
Other type of administrator 3
Counselor 4
No other position held 5
Other (SPECIFY) 6

QUESTIONS 13 THROUGH 15 ARE CONCERNED WITH YOUR TEACHING AND RELATED RESPONSIBILITIES AT THIS COLLEGE, AS WELL AS OTHER PROFESSIONAL RESPONSIBILITIES.

13. Please enter below the requested information on each course you are now teaching at this college as part of your regular load (as defined by your college). Each section of each course should be entered separately. Laboratory sections should be listed separately from lecture and discussion sections if held at different times. (RECORD OVERLOAD IN QUESTION 14.)

Course catalogue number	Number of students currently registered	Average number of hours spent per week				Number of credits for this course	Is course designed for transfer credit to a 4-year college? (CIRCLE ONE NUMBER)		Are there substantial portions of this course for which you feel you could be more adequately prepared? (CIRCLE ONE NUMBER)	
		Classroom teaching	Laboratory teaching	Other*	Total		Yes	No	Yes	No
							1	2	1	2
							1	2	1	2
							1	2	1	2
							1	2	1	2
							1	2	1	2
							1	2	1	2
							1	2	1	2
							1	2	1	2

*Include student contact time, preparing class and laboratory material, correcting papers, grading students, and advising students.

14. For courses and course sections you are carrying at this college as an overload (as defined by your college) please show the same information as in Question 13

(IF NO OVERLOAD, CIRCLE HERE). 1

Course catalogue number	Number of students currently registered	Average number of hours spent per week				Number of credits for this course	Is course designed for transfer credit to a 4-year college? (CIRCLE ONE NUMBER)		Are there substantial portions of this course for which you feel you could be more adequately prepared? (CIRCLE ONE NUMBER)	
		Classroom teaching	Laboratory teaching	Other*	Total		Yes	No	Yes	No
							1	2	1	2
							1	2	1	2
							1	2	1	2
							1	2	1	2
							1	2	1	2
							1	2	1	2
							1	2	1	2
							1	2	1	2

*Include student contact time, preparing class and laboratory material, correcting papers, grading students, and advising students.

QUESTION 15 ASKS ABOUT ACTIVITIES THAT ARE A FUNCTION OF YOUR POSITION AT THIS COLLEGE.
QUESTION 16 ASKS ABOUT ACTIVITIES THAT ARE NOT A FUNCTION OF YOUR POSITION AT THIS COLLEGE.

15. Please indicate the number of hours you usually spend each week on the following activities (MAKE AN ENTRY ON EACH LINE; ENTER ZERO IF NONE FOR THAT ACTIVITY):

Professional activities that are a function of your position at the college:	Number of hours
Classroom teaching, laboratory or shop (including preparation time), and other related classroom duties (including student contact time, preparing class material, correcting papers, and grading students)	
Administrative duties (including departmental administrative work, record keeping, preparing reports, faculty meetings, committee work)	
Performance and administration of research or development projects (including instructional projects)	
Professional reading (e.g., journals, new texts)	
Other college activities (e.g., advising students, advising student clubs) (SPECIFY) _____	
SUM OF ACTIVITIES	

16. Please indicate the number of hours you usually spend each week on the following activities that are not a function of your position at this college. (MAKE AN ENTRY ON EACH LINE; ENTER ZERO IF NONE FOR THAT ACTIVITY):

Professional activities that are not a function of your position at this college:	Number of hours
Adjunct teaching at this college, including other campuses	
Teaching at another educational institution:	
Two-year college	____
Four-year college	____
High school	____
Other	____
Working toward an advanced degree	
Research at another educational institution other than for an advanced degree	
Paid employment or consultation in a professional capacity in industry, government, or nonprofit organizations	
Self-employment, professional activities (e.g., consulting, editing, or writing)	
Activities connected with professional associations	
Other professional activities (SPECIFY) _____	
SUM OF ACTIVITIES	

QUESTIONS 17 THROUGH 23 ASK ABOUT YOUR PROFESSIONAL DEVELOPMENT PROGRAM PARTICIPATION SINCE YOU FIRST STARTED TEACHING, AND YOUR NEEDS FOR FURTHER PROFESSIONAL DEVELOPMENT.

17. Have you been a participant in one or more National Science Foundation institutes or other programs sponsored by NSF? (CIRCLE ONE)

Yes 1
No (SKIP TO Q.19) 2

18. If you answered YES to Question 17, please complete the table below, separately for those in which you participated prior to 1970 and since 1970.

Type of NSF program in which you participated	Year of participation		For programs since 1970: circle here if a substantial part was in the field(s) of your present teaching assignment
	Prior to 1970	Since 1970	
	(CIRCLE ONE)		
Summer institute	1	2	1
Academic year institute (full-time) .	2	2	2
In-service institute (part-time during school year)	3	3	3
Science faculty fellowship	4	4	4
Chautauqua conference	5	5	5
Other (SPECIFY) _____	6	6	6

19. Since 1970, have you participated in professional development programs or activities not supported by the National Science Foundation? (CIRCLE ONE)

Yes 1
No (SKIP TO Q.21) 2

20. If you answered YES to question 19, please complete the table below.

Type of non-NSF program	Circle the type(s) of program in which you participated	Circle here if a substantial part of this program was in the field of your current teaching assignment
Institutes or extended conferences sponsored by a federal agency other than NSF	1	1
Institutes or extended conferences sponsored by industry or a private foundation	2	2
Institutes or extended conferences sponsored by professional associations or other scholarly groups . . .	3	3
Formal course work at a college or university independent of outside sponsorship	4	4
Self-study courses	5	5
Practical work experience in a relevant field	6	6
Other (SPECIFY) _____	7	7

21. For your current teaching assignment, are there areas or topics in science or applied science in which you feel the need for further professional development? (CIRCLE ONE)

Yes 1
No (SKIP TO Q. 24) 2

22. List the programs you feel you need for your professional development.

Programs needed for professional development	Does a program exist that meets this need? (CIRCLE ONE)		If a program exists, are you planning to take it within the next year or two? (CIRCLE ONE)		
	Yes	No	Yes	No	Uncertain
A. _____	1	2	1	2	3
B. _____	1	2	1	2	3
C. _____	1	2	1	2	3
D. _____	1	2	1	2	3
E. _____	1	2	1	2	3

23. If in Question 22 above, you answered No or Uncertain to any of the programs you listed, what are your reasons for not planning to take this program in the next year or two? (INDICATE REASONS BELOW FOR EACH PROGRAM AS LETTERED FOR QUESTION 22.)

REASONS	Programs needed for professional development (CIRCLE ALL THAT APPLY) A	B	C	D	E
Intend to take an alternative education program	1	1	1	1	1
Quality of program is unsatisfactory	2	2	2	2	2
Program being offered too far away	3	3	3	3	3
Personal cost to me would be too great	4	4	4	4	4
My schedule will be too full	5	5	5	5	5
My college schedule or my other responsibilities conflict with the hours the program is offered	6	6	6	6	6
The college would not allow release or compensatory time to attend	7	7	7	7	7
Other (SPECIFY) _____	8	8	8	8	8

QUESTIONS 24 - 26 DEAL WITH STUDENT NEEDS

24. The following have frequently been identified as needs of students in two-year colleges. Identify those student needs that are of particular concern on this campus. (RANK ORDER THE CIRCLED ITEMS ACCORDING TO THEIR PRIORITY, BEGINNING WITH 1 AS HIGHEST.)

	(CIRCLE ALL THAT APPLY)	RANK ORDER
DEVELOPMENT OF BASIC SKILLS		
Language skills	1	_____
Math skills	2	_____
Study skills	3	_____
Basic manipulative skills for laboratory work	4	_____
Counseling on their need for basic skills	5	_____
OTHER NEEDS		
Advanced courses	6	_____
Honors courses	7	_____
Opportunities for practical experience	8	_____
Counseling for careers	9	_____
Courses offered more frequently than once a year	10	_____
Restructuring of courses and/or laboratory practices for use of non-traditional instructional methods . . .	11	_____
Supplementary learning materials	12	_____
Increased access to college resources:		
Library/learning resources	13	_____
Laboratories	14	_____
Faculty	15	_____

25. What does this college do to encourage the enrollment of the following student groups in science and technology?

	WOMEN	MINORITIES	HANDICAPPED
	(CIRCLE ALL THAT APPLY)		
Recruitment directed toward the groups 1	1	1	1
Special courses 2	2	2	2
Faculty sensitive to the needs of the group. . 3	3	3	3
Institutional policies and procedures 4	4	4	4
Auxiliary personnel trained to assist 5	5	5	5
Other (PLEASE SPECIFY) _____ 6	6	6	6

26. Has the college provided for physical access of handicapped students to science and technology classes?

(CIRCLE ONE)

Completely 1
Partially 2
Not at all 3

WE ARE INTERESTED IN THE ROLE . THE FACULTY IN THE EDUCATIONAL PLANNING PROCESS AT THIS COLLEGE. QUESTIONS 27 THROUGH 30 REFER TO THE SPECIFIC ASPECTS OF THIS PROCESS.

27. In general, for individual courses on this campus, what degree of responsibility does a member of the full-time faculty have for the following planning elements?

	Degree of Responsibility					
	None				Complete	Unable to answer
	(CIRCLE THE ONE NUMBER FOR EACH ELEMENT)					
Designing course outline, goals. . . . 1	2	3	4	5		6
Developing syllabus 1	2	3	4	5		6
Selecting text, or electing to have no text 1	2	3	4	5		6
Designing or choosing laboratory exercises 1	2	3	4	5		6
Choosing own teaching methods 1	2	3	4	5		6
Selecting science equipment for demonstrations and lab 1	2	3	4	5		6
Developing budgets 1	2	3	4	5		6

28. Have you participated in the planning of an individual course in this college?

(CIRCLE ONE)

Yes 1
No 2

29. In general, for a curricular program, as opposed to an individual course, what degree of responsibility does a member of the full-time faculty on this campus have for the following planning elements?

	Degree of Responsibility					
	None				Complete	Unable to answer
	(CIRCLE THE ONE NUMBER FOR EACH ELEMENT)					
Determining need for program 1	2	3	4	5		6
Preparing cost estimates 1	2	3	4	5		6
Outlining goals, defining student skills and educational outcomes . . . 1	2	3	4	5		6
Outlining program structure 1	2	3	4	5		6

30. Have you participated in planning a curricular program in this college?

(CIRCLE ONE)

Yes 1
No 2

QUESTIONS 31 AND 32 ARE CONCERNED WITH THE USE OF PART-TIME FACULTY IN THE FIELD IN WHICH YOU ARE TEACHING.

31. What is the approximate percent of course sections taught by part-time faculty on this campus in your teaching field(s)?

(CIRCLE ONE)

0 - 9	1
10 - 19	2
20 - 29	3
30 - 39	4
40 - 49	5
50 - 59	6
60 - 69	7
70 - 79	8
80 - 89	9
90 - 100	10

32. How do you feel about the proportion of course sections taught by part-time faculty on this campus in your teaching field(s)?

Too high		About right		Too low
(CIRCLE ONE)				
1	2	3	4	5

QUESTIONS 33 AND 34 ASK FOR YOUR ASSESSMENT OF THE NEEDS IN SCIENCE EDUCATION AT THIS COLLEGE.

33. Rate the institutional characteristics listed below in terms of their adequacy to support the science course(s) that you are teaching at this campus.

(CIRCLE THE APPROPRIATE NUMBER FOR EACH CHARACTERISTIC)

Institutional characteristics	Totally inadequate		Adequate		Excellent	Does not apply
1. Course structure	1	2	3	4	5	6
2. Classroom/lecture facilities	1	2	3	4	5	6
3. Class preparation areas	1	2	3	4	5	6
4. Lecture-demonstration facilities	1	2	3	4	5	6
5. Laboratory facilities (SPACE)	1	2	3	4	5	6
6. Laboratory apparatus and equipment	1	2	3	4	5	6
7. Budget for laboratory equipment and supplies	1	2	3	4	5	6
8. Laboratory usage	1	2	3	4	5	6
9. Instructional technicians (laboratory aides) -- quantity	1	2	3	4	5	6
10. Instructional technicians (laboratory aides) -- quality	1	2	3	4	5	6
11. Availability of teaching aids (films, other media)	1	2	3	4	5	6
12. Size of classes	1	2	3	4	5	6
13. Prior preparation of students	1	2	3	4	5	6
14. Clerical support	1	2	3	4	5	6
15. Library		2	3	4	5	6
16. Availability of professional journals	1	2	3	4	5	6
17. Opportunities of professional growth		2	3	4	5	6
18. Teaching environment	1	2	3	4	5	6
19. Articulation with transfer institutions policies on transfer of credits in my teaching field(s)	1	2	3	4	5	6

34. Of the institutional characteristics that you indicated in Question 33 as needing improvement, select the three which you consider as having top priority and enter the corresponding characteristic number below.

	Characteristic number
First priority. . . .	_____
Second priority . . .	_____
Third priority. . . .	_____

ATTACHMENT 1F

EDUCATIONAL FIELDS

Please use this classification to respond to Questions 6 and 7 of this questionnaire.

Where the general fields have been divided into finer categories, please use the finer categories as much as possible. When no applicable category is given, use the general field.

CODE	FIELD
010	Agriculture and National Resources
020	Biological Sciences
021	Botany
022	Ecology
023	Microbiology
024	Physiology and Human Anatomy
025	Zoology
030	Computer and Information Sciences
040	Engineering
050	General Science and Interdisciplinary Sciences
060	Mathematics
070	Nursing
080	Physical Sciences
081	Astronomy
082	Chemistry
083	Earth Sciences
084	Physics
090	Social Sciences
091	Anthropology
092	Economics
093	Geography
094	Political Science (Government)
095	Psychology
096	Sociology
100	Mechanical, Engineering, and Natural Science Technologies
101	Aeronautical and Aviation Technologies
102	Agricultural Technologies
103	Architectural Drafting Technologies
104	Chemical Technologies
105	Civil Technologies
106	Electromechanical Technologies
107	Electronic Technologies
108	Forestry and Wildlife Technologies
109	Home Economics Technologies
110	Industrial Technologies
111	Instrumentation Technologies
112	Laboratory Technologies (General)
113	Marine and Oceanographic Technologies
114	Mechanical Technologies
115	Nuclear Technologies
116	Textile Technologies
120	Health Related Occupations
121	Clinical Laboratory Services
122	Dental Services
123	Dietetic and Nutritional Services
124	Medical Instrumentation and Machine Operation
125	Mental Health
126	Nursing Related Services
127	Radiological Services
128	Other Health Related Occupations
200	Education
300	Other Non-Science or Professional

STUDENT QUESTIONNAIRE

National Science Education Survey

April 1979

QUESTIONS 1 THROUGH [illegible]OME PERSONAL INFORMATION ABOUT YOU. THIS INFORMATIO[illegible]TIAL TO THIS STUDY BECAUSE STUDENTS WITH DIFFERENT BACKGROUN[illegible]TEN HAVE DIFFERENT EDUCATIONAL GOALS AND NEEDS. FOR EXAMPLE, VERY LITTLE IS KNOWN ABOUT THE CHOICES MADE BY STUDENTS OF DIFFERENT AGE AND ETHNIC BACKGROUNDS.

1. What is your sex? (CIRCLE ONE)

Male 1
Female 2

2. How old were you on your last birthday? (CIRCLE ONE)

Less than 18 1
18-19 2
20-21 3
22-25 4
26-29 5
30-44 6
45-59 7
60 and over 8

3. To which of the following groups do you consider you belong? (CIRCLE ONE)

American Indian or Alaskan Native . . . 1
Asian or Pacific Islander 2
Black (except Hispanic) 3
White (except Hispanic) 4
Hispanic 5
Other (SPECIFY)_____

QUESTIONS 4 THROUGH 14 SEEK INFORMATION ABOUT YOUR EDUCATIONAL AND EMPLOYMENT STAT[illegible].

4. Have you earned either a high school diploma or a high school equivalency diploma? (CIRCLE ONE)

Yes (SKIP TO Q.6) 1
No 2

5. If your answer to Question 4 was NO, are you still in high school? (CIRCLE ONE)

Yes 1
No 2

6. Do you already have a college degree? (CIRCLE ONE)

Yes (SKIP TO Q.8) 1
No 2

7. Before attending this college did you attend one or more colleges without obtaining a degree or a certificate? (CIRCLE ONE)

Yes 1
No (SKIP TO Q.10) 2

8. If you answered YES to Question 7, what kind of college(s) did you attend? (CIRCLE ALL THAT APPLY)

Two-year college 1
Four-year college or university 2

9. Is your present educational program or curriculum the same as it was at your previous college(s)? (CIRCLE ONE)

Yes 1
No 2

10. In what year did you first enroll in this college? (ENTER LAST TWO DIGITS OF YEAR)

19__ __

11. Are you a full-time or part-time student, in terms of the number of credits you are taking this semester or quarter? (CIRCLE ONE)

Full-time 1
Part-time 2

12. How many credits are you currently taking?

_____ Credits

13. Are you employed? (CIRCLE ONE)

Yes 1
No (SKIP TO Q.16) 2

14. If you are employed, how many hours a week do you work on the average?

_____ Hours

QUESTIONS 15 THROUGH 18 SEEK INFORMATION ON YOUR EDUCATIONAL AND CAREER PLANS.

15. What is your career objective? (SPECIFY, FOR EXAMPLE: NURSE, COMPUTER PROGRAMMER, ENGINEER. IF "NONE" OR UNDECIDED, ENTER "NONE" BELOW)

_____

16. Please indicate your most important educational purpose for attending this college when you first enrolled. (CIRCLE ONE NUMBER IN COLUMN A)

Then indicate what you now consider your most important educational purpose. (CIRCLE ONE NUMBER IN COLUMN B)

Educational Purpose	Original purpose (COLUMN A)	Present purpose (COLUMN B)
Obtain associate degree and then transfer to a four-year college or university	1	1
Take some college level courses and transfer to a four-year college or university without obtaining associate degree.	2	2
Obtain associate degree and then find employment, with no immediate plan to transfer to a four-year college or university	3	3
Obtain certificate to upgrade or improve skills .	4	4
Obtain training in a special program.	5	5
Take one or more courses of special interest. . .	6	6
Try college to see if I like it	7	7
Other educational purpose (SPECIFY)_____		

17. In addition to purely educational purposes, what other reasons caused you to select this college? (CIRCLE ALL THAT APPLY)

Lower costs than other colleges 1
Convenient location 2
Courses meet at convenient times. . . . 3
Reputation of college 4
Other (SPECIFY) _____

18. Indicate in Column A any degrees which you have previously earned and indicate in Column B the highest degree you intend to seek during your lifetime. (CIRCLE ALL THAT APPLY FOR COLUMN A AND CIRCLE ONLY ONE FOR COLUMN B)

Degrees	Degrees earned (COLUMN A)	Highest degree to be sought (COLUMN B)
Associate degree	1	1
Bachelor's degree	2	2
Master's degree	3	3
Doctorate degree (research and teaching: PhD, EdD)	4	4
Doctorate degree (clinical practice: MD, DDS, DVM, Other)	5	5
None	6	6
Uncertain		7

QUESTIONS 19 THROUGH 27 REQUEST INFORMATION ABOUT YOUR COURSE OF STUDY

19. What is your major field of study? (INCLUDE A SPECIFIC MAJOR SUCH AS ELECTRON MICROSCOPY OR ART EDUCATION. DO NOT ENTER GENERAL FIELDS SUCH AS LIBERAL ARTS OR GENERAL EDUCATION. IF YOU DO NOT HAVE A MAJOR THEN ENTER "NONE" AND GO TO Q.20.)

_____ (SKIP TO Q.21 IF YOU DO HAVE A MAJOR)

20. I do not have a major field because (CIRCLE ALL THAT APPLY):

I have not yet decided on a major 1
I am not following a prescribed course of study 2
Other (SPECIFY)_____

21. What is your primary reason for enrolling in this particular course? (CIRCLE ONE)

It is required for my major (th... in Q.19) 1
It is required as part of my general program of studies (e.g., for a liberal arts or general education program 2
It is an elective for my major or general program of studies. 3
It is not part of my formal program. I am taking it for personal interest 4
Other (SPECIFY)_____

22. Please indicate how many separate courses in the sciences you are currently enrolled in (this quarter or semester) for each of the following field(s).

Include the course in which you received this questionnaire.

Educational field	Number of courses
Agriculture and natural resources	____
Biological sciences	____
Computer and information sciences	____
Engineering	____
Health sciences (e.g., nursing, radiological technology)	____
Mathematics	____
Physical sciences (e.g., chemistry, physics)	____
Interdisciplinary and general science	____
Social sciences (e.g., anthropology, economics, psychology do not include history)	____

QUESTIONS 23 THROUGH 26 ASK ABOUT YOUR EVALUTIONS OF THIS COURSE

23. How do you rate the quality of instruction in this science course? (CIRCLE ONE)

Excellent 1
Above average 2
Average 3
Below average 4
Very poor 5

24. How well does what is being taught in this course meet your educational needs? (CIRCLE ONE)

Completely. 1
Almost completely 2
About half way. 3
Relatively little 4
Not at all. 5
Uncertain 6

25. Would you recommend this science course (the one in which you received this questionnaire) to a friend? (CIRCLE ONE)

Yes 1
No. 2
Uncertain 3

26. What new courses in science, math, engineering, or technology would you like to see this college offer that are not being offered now (IF NONE THEN ENTER "NONE" BELOW)?

_____

_____

IF YOU ARE NOT MAJORING IN ONE OF THE SCIENCES, SOCIAL SCIENCES, MATH, ENGINEERING OR TECHNOLOGY, STOP HERE. PLEASE MAKE SURE YOU HAVE ANSWERED ALL QUESTIONS. PLACE THIS QUESTIONNAIRE IN THE ENCLOSED ENVELOPE, SEAL THE ENVELOPE, AND RETURN IT TO YOUR INSTRUCTOR. THANK YOU FOR YOUR ASSISTANCE IN THIS STUDY.

IF YOU ARE MAJORING IN ONE OF THE SCIENCE FIELDS, PLEASE CONTINUE WITH QUESTIONS 27-30. THESE QUESTIONS ASK YOU TO CONSIDER HOW SATISFIED YOU ARE WITH THE PROGRAM IN SCIENCE EDUCATION THAT YOU ARE TAKING AT THIS COLLEGE.

27. Below are some important characteristics of the science program of this college. Rate how satisfied you are with each characteristic, using a code of 1 for totally dissatisfied and 5 for totally satisfied.

If you have no experience with a characteristic on which to base a rating, circle the number 6 for no rating possible. (CIRCLE THE APPROPRIATE NUMBER ON EACH LINE):

Characteristics	Totally dissatisfied				Totally satisfied	No rating possible
Curriculum structure (set of courses required for your program of study).	1	2	3	4	5	6
Curriculum advising	1	2	3	4	5	6
College facilities for science:						
Classrooms	1	2	3	4	5	6
Lecture halls.	1	2	3	4	5	6
Laboratory space	1	2	3	4	5	6
Laboratory equipment	1	2	3	4	5	6
Scheduling of science courses (time of day, day of week). . . .	1	2	3	4	5	6
Size of classes in science. . . .	1	2	3	4	5	6
Library	1	2	3	4	5	6
Audio-visual materials.	1	2	3	4	5	6
Other (SPECIFY)_____	1	2	3	4	5	6

28. As a person majoring in one of the science fields, how much do you believe the science program in which you are enrolled meets your educational needs?
(CIRCLE ONE)

Completely 1
Almost completely 2
About half way 3
Relatively little 4
Not at all 5

29. What improvements do you feel should be made in the science education program you are receiving at this college to more completely meet your needs?

_____

_____

_____

_____

_____

30. Would you recommend the educational program or major field in which you are enrolled to a friend? (CIRCLE ONE)

Yes..... 1
No..... 2
Uncertain..... 3

PLEASE MAKE SURE YOU HAVE ANSWERED ALL QUESTIONS. PLACE THIS QUESTIONNAIRE IN THE ENCLOSED ENVELOPE, SEAL THE ENVELOPE, AND RETURN IT TO YOUR INSTRUCTOR. THANK YOU FOR YOUR ASSISTANCE IN THIS STUDY.

APPENDIX F

Weighting Procedures

APPENDIX F

WEIGHTING PROCEDURES

In order to develop a weighting system for the survey, it is necessary to have a clear understanding of the units of analysis of the study, and also of the populations they are intended to represent. Some rather unusual complexities are involved in defining the populations.

There are three separate units of analysis: the colleges, teachers, and students. The probabilities of selection are different for all three, although there are some interactions.

Colleges

The population of colleges is simply all colleges in the sampling frame. The weight for a school is thus the reciprocal of its probability of selection, together with an adjustment for nonresponse. The simplest, and probably best, adjustment for nonresponse is to treat the respondents as if they were the full sample. The weight in a cell is then N/n, where n is respondents. (Equal probability selection was used within cells.) To keep weights from being erratic, cells with no cases, and sometimes with only one or two cases, were collapsed. The collapsing patterns should attempt to group cells where approximately the same initial sampling rates were used.

The resulting weights are shown in the last column of Table F-1 (see page F-8). The other columns show the original weight, the population and respondent sizes, and the way strata were grouped for collapsing.

There are two sets of weights for colleges. Since 164 colleges completed the institutional questionnaire, while 168 colleges returned usable results for faculty and student questionnaires, the sample weights must reflect these different numbers in order for them to extend to the population of 1,232 colleges. The two sets of weights are shown in Table F-1 under columns for 168 and 164 institutions, applying respectively to all analyses for student and faculty questionnaires and for institutional questionnaire results.

The cells used for weighting should reflect the classifications established for sampling purposes. Even if information obtained for a sample school indicated that it was classified in a wrong cell (e.g., the true number of students may be different from the number anticipated), the weight should still be based on the original classification, although analytic tabulations can reflect the true situation.

Teachers

There are apparently two kinds of populations that can be considered for the analysis of the data. One is all teachers of science. The second is the set of teachers in specific fields. The total of teachers in the five fields is not exactly equal to the total number of teachers because some teachers instruct classes in different fields. For statistical purposes, teachers with classes in more than one field should be considered as teaching in each of the fields separately. For analyses of science teachers as a whole, the duplication should be eliminated.

However, experience has proved that the amount of duplication is trivial, and we have decided to ignore it.

For analysis of separate fields, each field is considered a separate population. The probability of selection of a particular teacher depends on the number of sections in that field he or she teaches and on the probability of one of the sections being selected within his or her school.

The probability of a section in a particular school being selected can be derived as follows. Initial sampling rates were developed to provide a self-weighting sample of classes in each field. These rates were based on an assumed population of 1,353 institutions and a sample of 186 respondents. Those rates are:

Field	Rate
1 - Life sciences	1/241
2 - Physical sciences	1/136
3 - Technology	1/122
4 - Mathematics	1/113
5 - Social science	1/273

Subsequently, three changes occurred in the composition of the population and sample that affected the effective sampling rates: 1) the number of institutions in the population was reduced from 1,353 to 1,232; 2) the number of responding institutions was reduced to 168; and 3) some of the teachers selected for the sample did not cooperate. The joint effect of the first two of these changes is reflected in the changes in weights shown in Table F-1. The effect of the third is to effectively reduce the sampling rate in a field by a factor of 1-R, where R is the teacher response rate for the field.

The following notation is used:

h = the field of science;

i = the stratum;

ij = the j^{th} teacher in a school in the i^{th} stratum;

NW_i = new weight in the i^{th} stratum;

OW_i = old weight in the i^{th} stratum;

S_h = initial overall sampling rate in h^{th} field;

R_h = teacher response rate in the h^{th} field;

m_{hij} = number of classes taught by the j^{th} teacher in the i^{th} stratum, in field h.

Then the effective sampling rate for a class in the h^{th} field, in the i^{th} stratum is

$$r_{hi} = S_h \times \frac{OW_i}{NW_i} \times R_h \qquad (1)$$

It should be noted that R_h is to be measured by having the selected teachers within the 168 sample schools in the denominator, not the original 186 schools. (The reduction from 186 to 168 is reflected in the change of old to new weights.) The numerator of R_h is the number of responding teachers.

The probability of a particular teacher being selected is m_{hij} times the probability of a class. It is therefore

$$P_{hij} = m_{hij} \times S_h \times \frac{OW_i}{NW_i} \times R_h \qquad (2)$$

Each teacher has the possibility of a different probability of selection. The teacher's weight is the reciprocal of the probability of selection.

In calculating the probabilities, the values of S_h are shown above (e.g., 1/241, 1/136, etc.), and the old and new weights are shown in Table F-1. The values of R_h were calculated.

All of these values were fed into the computer. The value of m_{hij} was obtained from the questionnaire for each teacher; it is the number of courses taught in the field.

Students

As in the case of teachers, two populations of students exist. One is the set of students taking courses in a particular field. The second consists of students taking any courses in science. However, unlike the situation for teachers, it is believed that considerable duplication exists among fields. Consequently, it is necessary to have two separate weighting methods. First we will consider weights for individual fields.

Student in a Particular Field -- The situation is quite similar to that of teachers, but with one additional component. If n_{hij} is the number of classes in the field a student is enrolled in, then the probability of one of his classes being selected is

$$r_{hij} = n_{hij} \times S_h \times \frac{OW_i}{NW_i} \times R_h \qquad (3)$$

where R_h is the proportion of the sample classes in the 168 schools in which students were actually sampled. To get the effective probability of selection, the sampling rate for students within the sample classes and the student response rate need to be incorporated, as follows:

t_{hij} = sampling rate in the class selected for the hij^{th} student;

R'_h = student response rate in the h^{th} field.

The probability of selection of a student is shown in (4). The weight is the reciprocal of this expression.

$$P_{hij} = t_{hij} \times n_{hij} S_h \times \frac{OW_i}{NW_i} \times R_h \times R'_h \qquad (4)$$

The values of t_{hij} and n_{hij} appear on the student and faculty questionnaires. The values of S_h and OW_i and NW_i are found on p. F-3 and in Table F-1, respectively. $R_h \times R'_h$ is the overall student response rate. It can be obtained as a single response rate, or the two terms R_h and R'_h may be obtained separately.

All Students Studying Science -- The probability of a student having any of his or her science classes selected is:

$$\sum_h \left(h_{hij} \times S_h \times \frac{OW_i}{NW_i} \times R_h \right) \qquad (5)$$

Given that a particular class is selected, the chance that the student will be selected is t_{hij}. Also, the adjustment for student response rate must be taken into account. The overall probability is then

$$P_{hij} = t_{hij} \sum_h \left(n_{hij} \times S_h \times \frac{OW_i}{NW_i} \times R_h \times R'_h \right) \qquad (6)$$

The weight is the reciprocal of this probability.

In formula (4), the only N_{hij} that is used is the number of courses the student takes in the field in which he or she is sampled. In formula (6), the number of classes in each of the five fields is used

Summary

To summarize the methods of obtaining weights, we have:

1. Data for colleges - weights are the figures in the last two columns of Table F-1;

2. Data for teachers - reciprocal of the formula in (2);

3. Data for students where analysis is for students taking courses in a specific field - reciprocal of the formula in (4);

4. Data for students where analysis is for all science students - reciprocal of the formula in (6).

Table F-1. Original and final weights for colleges

Stratum	Original weight	Population size	Number of respondents	Collapsed stratum number	New weight (168)	New weight (164)
1	--	17	0	1	--	--
2	10.57	74	5	1	19.40	19.40
3	8.25	30	4	2	8.25	8.25
4	3.43	21	7	3	3.00	3.00
5	2.00	3	2	4	1.50	1.50
6	2.00	1	1	5	1.00	1.00
7	2.00	2	1	6	2.00	2.00
8	95.50	55	1	7	17.06	17.06
9	12.94	235	16	7	17.06	17.06
10	8.05	164	19	8	8.63	8.63
11	4.97	179	30	9	5.97	5.97
12	4.45	106	19	10	5.58	5.58
13	3.45	116	31	11	3.74	4.14
14	3.00	44	15	12	2.93	2.93
15	--	4	0	1	--	--
16	--	2	0	1	--	--
17	--	3	0	2	--	--
18	--	0	0	-	--	--
19	--	0	0	-	--	--
20	--	0	0	-	--	--
21	--	0	0	-	--	--
22	17.83	99	6	13	16.50	16.50
23	8.57	61	[illegible]	14	8.71	10.17
24	4.50	9	2	15	4.00	4.00
25	4.00	5	2	15	4.00	4.00
26	--	1	0	15	--	--
27	--	1	0	15	--	--
28	--	0	0	-	--	--